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II

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83

PROCEEDINGS OF THE
EIGHTY-THIRD ANNUAL MEETING

Farm Show Building, Harrisburg, Penna.

JANUARY 20, 21 and 22, 1942

PENNSYLVANIA GROWN FRUIT TREES

I offer planters choice Pennsylvania grown fruit trees in all the leading varieties, including new double red strains of apples and the newer peach varieties. Stock examined and certified to be true to name by expert authorities. Prices are reasonable as sales are direct to the planter.

Write for Latest Catalogue and Prices.

Adams County Nursery & Fruit Farms
ASPERS, PA.

H. G. BAUGHER, Prop.
EST. 1905

State Horticultural Association of Pennsylvania

OFFICERS FOR 1942

President—H. M. Anderson, New Park
Vice President—J. Eric Linde, Orefield
Treasurer—Paul Thayer, Carlisle
Secretary—J. U. Ruef, State College

STANDING COMMITTEES

Executive Committee: The above named officers and R. J. Gillan, St. Thomas; H. F. Hershey, Hamburg; J. A. Runk, Huntingdon; H. W. Skinner, Chambersburg.

Legislation and Representatives on Agricultural Council: J. Eric Linde, Orefield, Ch.; G. F. Gillan, St. Thomas; M. E. Knouse, Peach Glen; J. T. Raine, Fairview; R. T. Criswell, Chambersburg; W. E. Grove, York Springs; W. O. Bingham, St. Thomas.

State Farm Show and Exhibition: Guy L. Hayman, Northbrook, Ch.; R. C. McDonald, Shippensburg; R. J. Gillan, St. Thomas.

Insect Pests: J. O. Pepper, State College, Ch.; H. N. Wortheley, State College; T. L. Guyton, Harrisburg.

Plant Diseases: H. W. Thurston, State College, Ch.; R. S. Kirby, State College; H. F. Hershey, Hamburg; R. H. Bell, Harrisburg.

Game Laws: J. A. Runk, Huntingdon, Ch.; Geo. Rohrer, Dryville; R. D. Anthony, State College.

State College Relations: J. A. Runk, Huntingdon, Ch.; E. B. Mitchell, Harrisburg; Guy Smith, North East; H. F. Hershey, Hamburg; Francis Reiter, Mars; C. L. Packard, Ore Hill; Ralph Crowell, Buckingham; Fred Griest, Floradale.

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PRESIDENT'S ADDRESS

H. W. SKINNER, Chambersburg, Pa.

The 83rd meeting of the Pennsylvania State Horticultural Association will please come to order. John Ruef has me down for an address, and I assure you I will not take up much of your time. First, I want to thank you for the honor you have conferred upon me in making me your presiding officer.

I note Sheldon Funk is going to tell us if we can make a profit off Fruit Farms. I will not steal any of his thunder on this subject, except to say, for the last several years the profits have been very short, in fact most of the past five years have shown us to be in the red. 1941 was an exception for we had a very nice profit.

Our Production Costs have mounted so greatly and the end is not yet. Spray materials, packages, labor and all the other items incident to production, while prices we are able to secure have not advanced. On the contrary they have been declining.

The labor situation, as I see it in our section is very acute, as I suppose it is all over our State. We have experienced difficulty in securing help for the last several years.

The Government has a very large construction program in our county, the building of a Munitions Depot, which will require 10,000 men, where they will get them I have no idea, they probably will draw from all sections, for the rate of pay will be much larger than we can afford. How we will be able to overcome this condition is more than we can figure out.

Another matter that has been in my mind for a long time is the Sale of Bulk or otherwise, of off-grade fruit. I have always felt that this practice has had a great influence on the prices of our No. 1 and better grades. How to overcome this obnoxious practice is beyond me. I have no specific recommendations to make, but it is one that should be studied and discussed freely. The Michigan law seems to be working satisfactorily. I feel if we would get together on this proposition we could work out some controlled plan.

I have always been interested in the Sales Promotion work done by the Appalachian Organization, some results of this work have proved definitely beneficial, the great drawback there has been lack of sufficient funds. Too many growers are willing to ride along without signing up.

Also a matter which we could give some attention, is a larger and thereby a more influential organization of our own Horticultural Association. I would suggest, when we return to our homes that we individually secure a new member to our own society. If you do not have a county society, go home and organize one, to be affiliated with the State Society.

Another thing that has come up, is the organization of a National Peach Council. In June of this year at Columbus, Ohio, a National Peach Merchandising Committee was named, this was followed later by a Peach Marketing Conference which was held in Richmond, Va., in November. Another is called to further the Organization at Charlotte, N. C., early in February. It seems to me the formation of a Peach Promotion Organization, in view of the tremendous planting which has taken place, we are likely to need some sales promotion to dispose of the increased production. I will try to arrange time for Lionel Newcomer to go over this in more detail. He has been in attendance at all these preliminary meetings.

Our business is not like any others, we can't close up our shop, we must do our pruning, our thinning, our spraying, cultivate our cover crops and many other operations which require help. This is a pessimistic picture which we have to face, possibly something may develop, it may not be as hard as we anticipate at this time. All we can do—is the best we can—feeling we are doing our duty in meeting these adverse conditions as they arise. In other words, take it on the chin.

P. S. Do not forget to attend the annual meeting of Appalachian Apples, Pennsylvania Division, in this room Wednesday evening at seven o'clock. A good program has been arranged.

RESOLUTIONS COMMITTEE REPORT

Your Resolutions Committee has met and we are pleased to submit the following recommendations for your consideration.

1. That we continue our efforts to provide more funds equipment for Research along Horticultural lines at Pennsylvania State College, especially in spray materials, fertilization and general practices including marketing.
   ADOPTED

2. That the proposed School of Horticulture be supported and we urge all members of the State Horticultural Association work for its erection and completion.
   ADOPTED

3. That we continue our efforts to secure the former livestock arena in its entirety, for apple, vegetables and ornamental Horticultural products; also that better police protection be granted for exhibits.
   ADOPTED

4. That we continue our efforts to secure a more suitable meeting place, or have the present room altered to eliminate noise and interference from other rooms for our speakers.
   ADOPTED

5. We recommend that the Association continue its efforts through the Legislative Committee to secure suitable legislation defining apple juice and its manufacture in Pennsylvania.
   ADOPTED

6. That we continue our efforts to amend the Grape and Potato Act to include apples and peaches.
   ADOPTED

7. We recommend that the Association adopt and endorse the National Peach Council, and that we set up a committee in the State, they to elect their Chairman and representatives to the organization meeting to be held in Charlotte, N. C., on February 4th and 5th, 1942.
   ADOPTED

8. We recommend the creation of a Committee to ascertain priority ratings for members, on supplies, materials, equipment, packages, etc.—this committee to work with groups from other states to secure as favorable ratings as possible from the office of O.P.M.
   ADOPTED

9. That the Association go on record as endorsing passage of H. R. #6324 known as the Walter Logan Bill designed to eliminate racketeering in the terminal markets.
   ADOPTED

10. That a Committee of three be appointed to meet with other farm groups interested in Federal, State Inspection Service, to review the situation with our State Authorities.
    ADOPTED

11. That Resolution of Respect be printed in our journal and sent to the families of Elmer R. Snyder of Florin, Lancaster County, Clayton Miller, of Marion, Franklin County, Howard Anderson of Stewartstown, and P. S. Fenstermacher of Allentown, who passed away during the past year.
    ADOPTED

12. That the Chairman of the Legislative Committee contact the State Superintendent of Schools, in regards to obtaining help during the thinning and harvesting seasons, suggesting shortening school terms to make help available during critical times.
    ADOPTED

J. ERIC LINDE
BENTZ KAUFFMAN
H. F. HERSHEY
PAUL THAYER.

FINANCIAL REPORT

PAUL THAYER, Treasurer

February 6, from former Treas. H. M. Anderson		$1,734.12
May 26, from Elizabeth B. Bricker dues		1.00
September 4, from York Co. F. G. Assn. dues		54.00
September 25, from Lancaster Co. F. G. Assn. dues		58.00
Dec. 1 Interest		28.91
		$1,876.03
Check for services L. E. Newcomer		150.00
Balance 1/20/42		$1,726.03

J. U. RUEF'S STATE COLLEGE ACCOUNT

Jan. 10, 1941 Balance		$ 269.58
Dues and Advertising		1,412.67
		$1,682.25
Total Expenditures	$1,423.20	
Balance 1/14/42	259.05	
	$1,682.25	
Balance in Treasurer's hands		$1,726.03
Balance in Secretary's hands		259.05
Total Resources		$1,985.08

We, the undersigned, have examined the above accounts and find them to be correct.

C. B. SNYDER
GEO. A. GOODLING
C. L. PACKARD

BORAX Supplies the BORON necessary for the correction of deficiencies in field and orchard crops.

Technical literature available upon request

Pacific Coast Borax Co.

51 Madison Ave. NEW YORK, N. Y.

PENNSYLVANIA STATE HORTICULTURAL ASSOCIATION EXPENDITURES—1941

Office—State College, Pa.

Jan.	27	First National Bank—Check book	$ 1.75
	29	Stamps	2.00
Feb.	1	Telephone and Telegrams	9.10
	8	Crabtree Co.—Apple Judging Contest Medals	34.50
	10	E. M. Stoddard—Expenses Harrisburg Meeting	29.37
	10	B. A. Porter—Expenses Harrisburg Meeting	27.15
	10	R. S. Marsh—Expenses Harrisburg Meeting	44.05
	10	H. G. Beattie—Expenses Harrisburg Meeting	37.42
Mar.	2	J. U. Ruef—4 trips Philipsburg 2/3, 2/10, 2/24, 2/28	10.40
	18	Philipsburg Ledger Co.—Envelopes	14.50
	22	Sylvia Meeker—Stenographic service	40.00
	22	Postage Stamps	3.30
	22	Postal Deposit—"March News"	10.00
	31	Mary E. Ruef—Stenographic aid "March News"	54.00
	31	J. U. Ruef—Transportation Philipsburg 3/2	2.60
Apr.	7	Philipsburg Ledger Co.—Printing	451.62
	17	Postage—Reports late renewals	.96
	21	Nittany Publishing Co.—500 Envelopes	20.50
May	12	Stamps	5.00
June	13	J. U. Ruef—2 trips Philipsburg 5/26, 6/8	5.20
	23	Mary E. Ruef—Stenographic aid "June News"	20.00
	27	J. U. Ruef—Transportation arranging tour	35.19
	27	Albert Sidney Noble—Refund on advertising	2.25
	27	Philipsburg Ledger Co.—"June News"	141.60
	27	Philipsburg Ledger Co.—1000-1½c stamped envelopes	19.72
	27	Philipsburg Ledger Co.—100 File folders	2.55
July	5	Telephone and Telegrams	3.39
	10	C. S. Minnich—Refund on dues	1.00
	14	Mary E. Ruef—Stenographic aid, "Fruit Tour Notices"	10.00
	21	Wolfe Floral Shop—Floral piece Mary Lois Thayer	5.10
	25	Philipsburg Ledger Co.—Fruit tour notices and stickers	14.00
Aug.	3	Telephone	1.46
	26	J. U. Ruef—Transportation Philipsburg 8/18, 8/25	5.20
Sept.	2	Telephone and Telegrams	4.63
	5	Myla S. Wert—Stenographic service	5.00
	5	W. B. Keeler—Gummed labels	5.20
	12	Philipsburg Ledger Co.—Printing Adv. Rate Cards	3.35
Oct.	4	Mary E. Ruef—Stenographic aid, "Sept. News"	20.00
	6	Philipsburg Ledger Co.—Printing "Sept. News"	137.30
	15	Sylvia Meeker—Stenographic service	25.00
	21	Telephone	.90
	21	J. U. Ruef—Transportation Philipsburg	2.60
Nov.	5	Philipsburg Ledger Co.—3500-6½x9½ envelopes	26.25
	5	Philipsburg Ledger Co.—1000-3c envelopes	36.47
Dec.	3	Telephone	2.08
	5	Mary E. Ruef—Stenographic aid "Dec. News"	21.50
	10	J. U. Ruef—Transportation Philipsburg 11/23, 12/4	5.60
Jan.	2	St. Louis Button Co.—Buttons Harrisburg Meeting	20.78
	2	Crabtree Co.—Apple Judging Contest Medals	37.95
	5	Telephone and Telegrams	3.71
		Total Expenditures	$1,423.20

RECEIPTS 1941

Jan.	10	Cash Balance	$ 269.58
	27	Dues and Advertising	248.00
Feb.	10	Dues	39.00
Mar.	3	Dues and Advertising	99.60
	17	" " "	119.00
	22	" " "	45.00
	31	" " "	123.63
Apr.	7	" " "	88.25
	15	" " "	37.00
	21	" " "	42.00
May	5	" " "	50.50
	12	" " "	57.00
	28	" " "	53.62
June	27	Dues	31.00
July	10	Dues and Advertising	80.00
	21	Advertising	53.00
Sept.	5	Dues and Advertising	35.50
Oct.	6	Advertising	121.50
	15	Advertising and Dues	24.12
Dec.	5	" " "	35.50
Jan.	13	" " "	29.45
		Total Receipts	$1,682.25

TOTAL RECEIPTS—1941

Cash Balance as of January 10, 1941	$ 269.58
Advertising and Dues	1,412.67
	$1,682.25
Total Expenditures	$1,423.20
Bank Balance—State College, January 14, 1942	259.05
	$1,682.25

AFFILIATED COUNTY ORGANIZATIONS AND OFFICERS FOR 1942

Adams—	Pres.	Frederick Griest	Flora Dale
	V. Pres.	Robert C. Lott	Aspers, R. D.
	Sec.-Treas.	Geo. Schriver	Bendersville
Allegheny—	Pres.	Earl Shenot	Wexford, R. 1
	V. Pres.	Edw. Shenot	Wexford
	Treas.	S. L. Simmons	Frank St., Box 55, Pittsburgh 10
	Secy.	Harry Wilson	11201 Frankstown Rd., Wilkinsburg
Bedford—	Pres.	A. E. Hoover	New Paris, R. 1
	Sec.-Treas.	Reynolds Hyde	Manns Choice
Blair—	Pres.	Chas. L. Packard	Roaring Spring
	V. Pres.	Frank Fox	Hollidaysburg
	Sec.-Treas.	John Bice	Hollidaysburg, R. D.
Berks—	Pres.	C. Y. Delong	Mertztown, R. D. 2
	V. Pres.	Carl Schoelkopf	Sinking Spring, R. D. 1
	Sec.-Treas.	Aaron L. Ebling	Reading, R. D. 2
Bucks—	Pres.	Ralph T. Crowell	Buckingham
	V. Pres.	Elbert Holderman	Doylestown
	Sec.-Treas.	W. M. Amos	Warminster
Carbon—	Pres.	Ira Hottenstein	Lehighton, R. 3
	V. Pres.	Walter McLean	Lehighton, R. 2
	Sec.-Treas.	Wm. H. Gregory	Weatherly, R. 2
Ches.-Del.—	Pres.	John Imsweiler	409 W. Union St., West Chester
	V. Pres.	J. Gordon Fetterman	Media
	Sec.-Treas.	H. C. Worthington	Glen Mills, Pa.
Erie—	Pres.	D. C. Pasche	North East
	V. Pres.	Forrest Meeder	Girard
	Treas.	Clifford Wickersham	East Springfield
	Secy.	F. H. Dunn	Harbor Creek
Franklin—	Pres.	D. M. Bream	Chambersburg
	V. Pres.	G. G. Gillan	St. Thomas
	Secy.	J. H. Knode	Chambersburg
	Treas.	G. R. Grissinger	Chambersburg
Indiana—	Pres.	Clarence McHenry	Indiana
	V. Pres.	Ralph Miller	Homer City
	Sec.-Treas.	Harry Stonebraker	Indiana
Lackawanna—	Pres.	A. W. Wiggins	Clarks Summit
	V. Pres.	M. S. Ladd	Waverly
	Treas.	John W. Klipple	Clarks Summit, R. D. 2
	Secy.	S. J. Coon	Clarks Summit, R. D. 2
Lancaster—	Secy.	Simon R. Snyder	Ephrata, R.1
Lawrence—	Pres.	C. M. McCormick	Slippery Rock, R. 3
	V. Pres.	Rankin S. Johnston	New Wilmington, R. 1
	Sec.-Treas.	Carl Baldwin	655 E. Washington St., New Castle

Lebanon—	Pres.	Peter R. Boltz	Lebanon, R. D. 3
	V. Pres.	J. Morris Horst	Lebanon, R. D. 3
	Sec.-Treas.	Ira K. Dutweiler	36 N. 8th St., Lebanon
Lehigh—	Pres.	Earl Mackey	Orefield
	V. Pres.	A. J. Dennis	Zionsville, R. 1
	Sec.-Treas.	A. L. Hacker	445 Hamilton St., Allentown
Luzerne—	Pres.	Nelson Lewis	Pittston, R. D. 1
	V. Pres.	Wm. Smith	Berwick, R. 1
	Sec.-Treas.	Harold Brace	Dallas, R. 3
Mercer—	Pres.	J. N. Hughes	Mercer, R. D. 1
	Secy.	W. R. Forrester	Mercer
Schuylkill—	Pres.	B. F. Kunkle	Tamaqua, R. 1
	V. Pres.	John Shaener	New Ringgold
	Sec.-Treas.	Marlin L. Koch	McKeansburg
Venango—	Pres.	J. A. McElhaney, Jr.	Franklin, R. 2
	V. Pres.	Frank H. Turner	Franklin, R. 2
	Sec.-Treas.	C. D. Sutton	Franklin
Wyoming—	Pres.	Herbert Hunter	Falls
	Sec.-Treas.	Herbert Smith	32 Slocum Ave., Tunkhannock
York—	Pres.	Russell Shaw	Stewartstown
	V. Pres.	J. B. Kauffman	York, R. D. 7
	Secy.	Geo. A. Goodling	Loganville
	Treas.	S. A. Smith	Yoe

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ELGETOL is a non-caustic dinitro dormant spray that can be applied without fear of skin irritation. Spray operators using a material that does not burn the skin will do a much more efficient job of spraying, which is a mighty important factor in the success of any spray program.

ELGETOL controls Aphid, Bud Moth, Oyster Shell Scale, Cherry Case-Bearer, Pear Psylla, and is used as a **ground spray** control for Apple Scab, Cherry Leaf Spot, Raspberry Anthracnose, and Asparagus Rust. ELGETOL can also be combined with oil to control both Aphis and Scale insects with one application.

Write for 1942 ELGETOL spray chart which gives the latest recommendations and directions for use.

STANDARD AGRICULTURAL CHEMICALS, INC.

1302 Adams Street, Hoboken, New Jersey

JUNIOR APPLE JUDGING CONTEST

Schuylkill, Lehigh and Franklin counties were represented by the winning teams in the 1942 Junior Apple Judging Contest which was held in connection with the annual Farm Show. Seven classes of three plates each were required to be placed by each contestant as well as the identification of fifty apples of fifteen varieties. The coaches of each team should be congratulated upon their willingness to give of their time in training their teams. Frequent meetings either in packing sheds or in orchards appear to be necessary to place among the winners.

In order to stimulate interest and also hold the interest of former contestants a change in the regulations permits any individual to continue as a contestant providing he was not a member of a team winning first place and has not passed the age limit.

At the present time awards are made on team performance. Perhaps changing the rules prior to the judging contest so that individual performances would also be considered in making awards might increase the number of contestants.

Contestants	Indiv. Score	Team Score	Placing
Smith Armstrong, Jr.	839	Franklin 3371	3rd
Verne Pheil	1069		
Glenn Christman	1463		
Earl Ryland	1503	Schuylkill 3872	1st
Chas. Hill	1417		
Mark Herb	952		
Calvin Geiger	1247	Lehigh 3441	2nd
Stephen Weslasky	1040		
Andrew Simock	1154		

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MICRO-MESH SPRAY HYDRATED LIME
325 MESH SPRAY HYDRATED LIME

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NATIONAL PEACH COUNCIL CONFERENCE

From "Hoosier Horticulture"

At the close of the National Apple Institute Meeting in Columbus, Ohio, in June of 1941, a temporary National Peach Merchandising Committee was named. The purpose of this committee was to aid in advertising the 1941 peach crop and to offer suggestions on the marketing of this crop which was much larger than recent U. S. crops. Although the ten-year average peach crop is fifty-four million bushels, the 1941 crop totaled over sixty-nine million bushels or about fifteen million above normal.

Time was too short for the development of any coordinated national program of advertising and marketing of the 1941 crop. The temporary committee members therefore, operated more or less separately in their own states. Much good was done, especially since many of these state committees were able to take advantage of opportunities for close cooperation with the allied agencies and industries, such as state extension services, sugar companies, national sales agencies, etc. In our own state of Indiana, much publicity was released from the divisions of home economics and horticulture at Purdue University. This consisted of articles in daily and weekly newspapers and broadcasts over many of the radio stations serving Indiana and neighboring states. In this publicity, the food and vitamin values of peaches was stressed, information on preparation of peaches for preservation as well as for daily use was given, and suggestions were made to the buying public on the selection of fruit for canning as well as for daily use. Since Indiana markets a high percentage of the peach crop, locally at the farm as well as through close-by retail agencies, the value of tree ripened fruit was stressed in the publicity in this state. There was much favorable reaction to this brief program of publicity in Indiana, both on the part of growers and consumers.

Since these hurriedly prepared advertising programs in the various states aided so definitely in the marketing of the unusually large peach crop, undoubtedly a coordinated national program which would parallel the state efforts, would increase very materially the use of peaches and promote more orderly marketing of the national crop. For this reason a permanent national peach council has been proposed.

A call was issued for a National Peach Conference at Richmond, Virginia, on November 12. Forty-eight representative growers, distributors, and state and federal specialists from major peach growing states attended this first conference. As a result of a thorough discussion of the entire situation there was set up at this conference an organizing committee consisting of one person from each interested state represented, and provisions were made for enlarging this committee by the addition of other members from other states. Carroll R. Miller of Martinsburg, West Virginia, was named Secretary of this committee. The committee has prepared a tentative draft for the new organization which is to be submitted to the Horticultural Societies in the various states for their consideration. This council and Indiana's possible representation on the council will be considered at the Annual Meeting of the Society which will be held at Purdue University in the Horticultural Building, Tuesday, Wednesday and Thursday, January 13, 14 and 15. Indiana peach growers are urged to be present at this meeting to discuss the present situation and the possible cooperation of the Indiana industry.

The Peach Situation

The average peach production during the past ten years has been fifty-four and one-third million bushels or over fifteen million bushels above normal. This great increase in production is largely the result of increased plantings made during the past few years, for peach acreage has been on the increase. In 1940, there were 68,600,000 peach trees, or two and one-third million more than in 1935. The peach crop for some years may average from sixty to seventy million bushels, because of the fact that there are nine million more non-bearing trees in 1940 than in 1935. The peach crop, therefore, is expected to be about one-half the size of the nation's apple crop, and with only ten weeks to market, while the apple crop is marketed over a period of forty or more weeks.

Sales competition is much greater today than a few years ago, not alone because of the increased production of peaches but because of heavier supplies of competing fruits and vegetables. Supplies of all fruits and vegetables (except white potatoes), now are estimated at approximately twenty million tons yearly. The supply totaled twelve million tons in 1920. Today, therefore, we have eight million more tons to be consumed with only a seven per cent increase in population. Peaches are the fourth largest fruit by volume grown in the United States. They are produced commercially in thirty-three states by thousands of growers. This complicates the marketing problem and makes organizing more necessary. These thousands of growers are a great potential strength from the viewpoint of promotion, publicity, etc. These thousands of peach growers over the almost entire nation will provide, if organized, a powerful machine to work with the allied industries in the promotion and sale of increased volume of a better grown, better prepared, and better advertised pack of peaches.

The Immediate Program

The organizing committee named at the Richmond meeting is already preparing the framework for the National Peach Council and formulating a program of work. The program already embraces suggested removal of cull trees, a general improvement of the quality of peach pack offered to the consumers, a coordinated publicity program which will utilize state and federal educational agencies, National Food Manufacturers and Distributors, Utilities, Newspapers and Magazines, Radio and Movies; grower-grocer sales cooperation, and research, particularly from the viewpoint of development of peach products and continued marketing and production studies.

The Proposed Procedure

The satisfactory operation of a Peach Council depends upon proper financing. The first problem, therefore, is the raising of the necessary funds required for the initiation of essential parts of this national program. The first budget calls for a total of twelve thousand dollars to finance a modest beginning program. It is proposed that this amount shall be raised through a program of voluntary assessment based upon individual production if cooperating state is to set up an effective peach marketing committee through which growers of that state can be organized. A National Conference then will be called probably in February to consolidate the growers' wishes, to effect the permanent organization, and to write the program of work. This national grower committee representing the cooperating states, will then hire a capable manager who will carry out the program.

PENNSYLVANIA'S PART IN THE NATIONAL PEACH CONFERENCE

As Explained by R. B. DONALDSON, State College, Pa.

A conference for the discussion and development of a National Peach Council was held at Charlotte, North Carolina, on February 5 and 6, 1942. Growers and marketing specialists from 10 peach states were in attendance at the conference, which was presided over by Mr. Carroll R. Miller.

The actual working outline of the National Peach Council was represented by Carroll R. Miller, and consisted of four major policies: Sound financing, sound organization, efficient management, and loyal support. State by state, the delegates reported on the attitude of growers in their states toward the Council. Weighing these reports fully, the conference voted that evidence of active grower support was ample, and that the meeting proceed with establishing the National Peach Council.

The following resolution was presented to the delegates assembled and unanimously approved by each state in separate vote:

"Representatives of peach growers in this meeting at Charlotte, North Carolina, on February 5 and 6, 1942, do hereby agree unanimously:

"1. That an organization be set up under the General Corporation Act of the State of Delaware to be known as the National Peach Council with general offices located in Washington, D. C., or temporarily as near that city as possible.

"2. That the territory included in the Council at the set be the states of Alabama, Georgia, South Carolina, Tennessee, Kentucky, Pennsylvania, New Jersey, New York, Virginia, West Virginia, Maryland, Delaware, Ohio, Illinois, and Indiana, with additional territory to be added as conditions warrant.

"3. That a minimum of $12,000 be subscribed by the member States on the following basis: Georgia, $3,000; South Carolina, $2,500; North Carolina, $2,000; Pennsylvania, $2,000; Virginia, $1,500; New Jersey, $300; Maryland, $200; West Virginia, $200; Tennessee and others, $300; and of this amount 50 per cent is to be paid by March 15, 1942, and the remainder at the maturity of the 1942 peah crop of each subscriber State.

"4. That officers be elected at this meeting consisting of Carroll R. Miller as president, two directors from each State represented at this meeting, and an Executive Committee of 5 members selected from the directors from Georgia, South Carolina, North Carolina, Virginia, and Pennsylvania. The Executive Committee shall be empowered to select a secretary, manager, and a treasurer.

"5. That a report be made by the directors of each State to the president when the allotment for each state shall have been subscribed and when one-half of the total amount or $6,000 shall have been paid in, this to be not later than March 15, 1942. Following this action, the Executive Committee is hereby authorized to proceed with the necessary legal steps to organize and set the Council in operation.

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"6. That a final organization meeting be held in Washington, D. C., at the call of the president for the purpose of considering and ratifying the above action of the Executive Committee."

The following were selected as directors of the National Peach Council from each State:

Georgia	W. M. Wright, Fort Valley, Ga. Wilmer M. Dickey, Musella, Ga.
South Carolina	Troy H. Cribb, Spartansburg, S. C. L. V. Holmes, Johnston, S. C.
North Carolina	Howard R. Harrison, Eagle Springs, N. C. C. D. Mathews, Hamlet, N. C.
Tennessee	S. N. Varnell, Cleveland, Tenn.
Pennsylvania	Lionel Newcomer, Boyertown, Penna. Grover Eldridge, Sale Creek, Tenn. R. Johnston Gillan, St. Thomas, Penna.
New Jersey	Lester Collins, Moorestown, N. J. Arthur J. Farley, New Brunswick, N. J.
Maryland	Stanley Fulton, Hancock, Md. Wm. Gardenhour, Smithsburg, Md.
Virginia	Chesley A. Haden, Crozet, Va. E. D. Nininger, Roanoke, Va.
West Virginia	J. Howard Rannells, Romney, W. Va. M. M. Brown, Martinsburg, W. Va.

An Executive Committee was designated as follows:

W. M. Wright, Fort Valley, Ga.
Troy H. Cribb, Spartansburg, S. C.
C. D. Mathews, Hamlet, N. C.
Chesley A. Haden, Crozet, Va.
Lionel E. Newcomer, Boyertown, Penna.

PEACH MARKETING AHEAD

By CARROLL R. MILLER, Martinsburg, W. Va.,
Secy.-Mgr. Appalachian Apple Service, Inc.

A juggernaut, big enough to hold fifteen million bushels of peaches, is loose in the nation's orchards. It has been built by the growers themselves, by their heavy plantings of the past six years. There were nine (9) million more young peach trees (just coming into bearing) in 1940 than in 1935.

These 9 million young peach trees, plus increased per-tree production that has climbed steadily with better production methods, plus the decline in per-capita consumption of peaches, are the juggernaut—a huge, monstrous machine that will wreck everything unless it is controlled. Growers built the juggernaut; and growers can get aboard and guide it to their advantage instead of to their wreckage, **if they will.**

The coming 5 years will probably see an average national peach crop of 65-to-70-million bushels; against the 1930-39 average of 54 millions. Last year's crop was almost 70 million bushels—15 million bushels bigger than average; and the Carolinas **can** produce 4 times as many peaches as they did last year, their growers tell us. Somewhat the same holds for some other eastern states. We face the job of marketing half as many peaches as are in the national apple crop, with about 10 weeks to market the peaches, against 40 weeks to market apples. That should stop any peach grower right in his tracks, to take thought of the future.

Help is available. Several powerful agencies are ready, with trained help and effective organizations—the Grocers—through their chains and associations, who can either make or break a deal by pushing a product or neglecting it: the Government, federal and state, with their powerful publicity facilities, their giant research laboratories, some with a million dollars a year to work with; with their staffs of thousands of home economists and county agents and specialists. The Press and Radio stand ready to help.

But all these will help **only** if Peaches go to them as a national industry. Only a few retailers will help to feature one state's products. The federal Government is not at all interested in pushing one state ahead of another. The Press and Radio cross state lines too often to pay much attention to appeals from a local, little group, especially when these appeals are nothing but wails for help—offer nothing in well-prepared articles and data which the dailies and the radio can use. "The farmer crying in his beard" gets no sympathy. But a great nation-wide industry, presenting a balanced usable program, receives a wealth of quick cooperation from retailers, government and the public.

We know this because we have proved it—in Apples for six years; and in Peaches last summer. Late last spring, when the big national peach crop loomed as a certainty, a lot of our forward-looking peach growers in this belt grew nervous. Something should be done to help market the coming 70-million bushel crop. Hastily, we organized to do what we could—worked to build up "home canning" through Department of Agriculture's extension agents, their publicity bureau, etc., and appealed to the organized retailers, for their help, supplying them with posters as tangible evidence of our own efforts to help ourselves. For "The Lord loves those who help themselves." We tied in with everybody in sight—with the Georgia-Carolinas group, with the Eastern Shore group, with the National Food manufacturers.

Results surprised us. Truckers and grocers alike reported that housewives were really "home canning" peaches; for the first time in years. We didn't make much impression in the big cities. They will take more time and education. But in the smaller towns and the country, the program got thousands upon thousands of bushels of peaches into Mrs. Consumer's hands for home canning.

Home canning can be built up to use a lot of the oncoming flood of peaches. But that alone won't sell enough peaches fast enough to give you a good market; not with 70 million bushels to market in 10 weeks. Commercial canning must be developed. Quick-freezing is a natural for peaches. It must be developed. Dried peaches used to be a big seller. They have a real place in the Amrican diet; can be brought back into usage. But this can be done effectively only through cooperation between growers and canners. The canners must have guarantees of tonnage to work on. The growers must give those guarantees, and must see that the canners are high-grade canners, not the "gyp" canner who will put offal into cans. All these things require cooperation, organization.

Today, food is coming to be sold on the basis of its health and nutrition values. Penny-saving and palate appeal are minor things, after all, it seems. Things are certainly working that way rapidly, at least.

Peaches don't enter today's health picture. They are not on the Government's charts of essential fruits, from which all newspapers, magazines, radios, writers and home economists are taking their programs. Oranges are very prominent on these charts. The orange people started 15 years ago to invest $50,000 a year in scientific research into the health values of citrus. They did a good job of publicizing this to the public and the medical profession.

Now the orange is high in Vitamin C. but is not very impressive in any other vitamin or food value. The peach is much higher. comparatively, in Vitamin A than the orange is in Vitamin C. But did you know that the peach far outranks all other major fruits in the powerful Vitamin A content? You didn't; and only a few other people do.

The peach, like the apple, has plenty of genuine food-nutrition value. But we have got to have them determined, scientifically, before we can advertise it; before the nutrition authorities will include peaches in their "must" lists. That research takes time. We must get it under way. We are about 10 years late now—10 years behind the procession. We can get these determinations made for us, at small cost, if we go after them as a national peach industry.

Those are onlly a few of the problems, and opportunities, that lie ahead for peaches. The good work done last Summer, in a beginner's amatuerish way, should be carried on, consistently. Many groups of leading peach growers from many peach belts are urging that the peach industry step out for itself with a national peach council, instead of everlastingly tagging along behind other fruits, trying to scream "Me, too".

An all-eastern peach conference was called at Richmond, Va., Nov. 12th. A skeleton program was developed there, and was ordered taken back to the growers of the peach states, in their annual conventions, to find out the growers' sentiments and support. On February 6 and 7, at Charlotte, N. C., another national peach meeting will be held. At that conference, they will want to know Pennsylvania growers' wishes; whether Pennsylvania peach growers will join with the other states in supporting the National Peach Council; whether Pennsylvania, fifth largest peach state, will help guide this new 15-million bushel juggernaut that is among us. The plan is to make the fee one-half cent per bushel: one-half of this payable in advance; the remainder at the end of the peach session. One thing is certain:—We are not going into this unless the financing is solid. There will be no "shoe-string" stuff.

So I am offering this Society, in convention assembled, this resolution—the same one submitted to many of the other peach states. Your Resolutions Committee will give you the chance to vote upon it. It simply states the seriousness of the peach outlook ahead; notes that in common sense something practical should be done to help; and suggests the National Peach Council, with a grass roots foundation—going right back through state and county to the individual grower for its control and support.

The proposed Peach Council, carefully and practically started with a modest budget, and growing by its work and experience, should before long take its place alongside American Meat Institute, National Dairy Council, National Apple Institute and kindred bodies which have done so much for their industries and their member's price-levels.

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PROBLEMS CONFRONTING THE PEACH GROWER

F. P. CULLINAN, Principal Pomologist, Division of Fruit and Vegetable Crops and Diseases, United States Department of Agriculture, Bureau of Plant Industry.

Orchardists now planning their program for the coming season are asking a number of questions. Some of those most frequently heard are: What are the prospects of a large crop in 1942? What is the effect of the drouth on bud vigor? With the shorter terminal growth and scant bud set in some sections, should trees be pruned lighter or heavier? With the prospect of labor shortage, will we be able to prune the trees and thin the fruit as thoroughly as we would like to do? And will we be able to purchase fertilizers, spray materials, and containers for fruit? These and many similar questions are asked when fruit growers get together. In discussing problems confronting peach growers in the coming year, we should consider what practices must be followed and how these practices may be modified to meet changing conditions. We recognize that there are certain things that the grower must do if fruit of good size and quality is to be produced.

The outlook for the peach crop for the coming year is for production not in excess of the crop of the past season and probably somewhat less. That crop, approximately 69 million bushels, was the largest since 1931. Since most peach trees in all sections bore a crop during the past season, it is not anticipated that the bud set will be in excess of that of last year. As you know, the number of buds produced on peach shoots is usually less following years of a heavy crop. There are some indications that the freeze of early January has damaged dormant fruit buds in a few important peach-growing sections. While this may not greatly affect total production for the country as a whole, it seems reasonable to expect that the crop will not be larger than that of last year, and in those areas where the bud injury is severe the amount of crop will be greatly reduced. In many parts of the eastern United States, peach trees were affected somewhat by dry weather that prevailed during the early part of the 1941 growing season and prior to time of harvest. In a few localities this dry weather at harvest time was sufficient to affect fruit size, and trees with a heavy crop bore small fruits. In most sections, however, the dry weather did not seriously affect fruit growth at harvest time. The greatest stress on peach trees came in September and October, after the crop had been harvested. In some areas where the rainfall was light in the early part of the growing season and the trees were carrying a heavy crop, terminal growth was affected. In these areas the growth is short and the diameter of shoots is small. There are no indications, however, that the drouth has been so severe as to weaken the trees,

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except in a few cases where moisture shortage prevailed for 2 or 3 months. Under those conditions, it may be desirable, as will be pointed out later, to modify orchard practices somewhat in order to encourage best growth of trees during the coming year.

Assuming that the winter cold may not thin the buds further unitl time for the dormant pruning, it may be well to consider how pruning will reduce the number of fruits that set and consequently reduce the amount of hand thinning required. In 1940 some tests were carried on at the U. S. Horticultural Station at Beltsville on a block of Elberta trees that had made excellent growth during the previous season and had formed a heavy set of buds. In the early winter of 1940 some of the trees were pruned heavily, with some cutting back and a well-distributed thinning out of shoots throughout the trees; others were pruned in the same manner after the trees had blossomed; while still others were left unpruned. No fruits were thinned from any of the trees. A very favorable growing season occurred in 1940, which favored good size of fruits. Some of the unpruned trees produced 10 to 15 bushels, while the pruned trees produced at most 8 and 9. Yields and size of fruit from five representative pruned and unpruned trees are shown in table 1. It is apparent that pruning has greatly reduced the number of fruits that set and that considerable fruit increase in size resulted from the pruning. Although the fruits were thinned on the pruned trees, they developed good size in a favorable growing season.

Table 1. Effect of Dormant Pruning on Size of Fruit.

Tree	Per cent under 2 inches	Per cent over 2 inches	Total Yield in number (50lbs.)	Yield in bushels above 2 inches	Total number fruit
			Dormant - Pruned		
2	14.4	85.6	7.5	6.4	1,653
3	4.2	95.8	6.0	5.7	1,188
4	7.0	93.0	6.0	5.6	1,404
5	38.0	62.0	9.0	5.6	2,436
6	14.0	86.0	5.5	4.7	1,000
			Unpruned		
10	75.0	25.0	11.0	2.7	3,322
11	55.5	44.5	10.5	4.7	2,935
12	68.0	32.0	11.0	3.5	3,246
13	74.0	26.0	9.5	2.5	2,840
14	75.0	25.0	12.5	3.1	3,872

The trees that were pruned after the blossoms had opened did not make as good growth during the season as the winter-pruned trees. The removal of a large number of young leaves with the opening flowers is often devitalizing to peach trees. While it is a common practice in some regions where there is danger of losing a crop by late winter freezes, to delay pruning as late as possible, this practice should be followed only where labor is available to complete the pruning job before leaf buds open. Delaying the time of pruning on trees that have had a large number of blossom buds killed may not be so serious, since the amount of wood removed in late pruning will probably be less and the set of fruit on the trees will also be less.

The amount of pruning to give bearing peach trees in any year will depend upon previous pruning treatment and general vigor of the trees. For example, trees that have been pruned annually and are making good shoot growth should continue to receive the same treatment. If heavier pruning is given such trees this year, it should be largely of a thinning nature, to reduce the number of fruits that may set and thus the amount of hand thinning required. On the other hand, trees that are getting too tall or too thick and have not been adequately pruned in recent years will be benefitted by relatively heavy pruning, and the saving in cost of fruit thinning on tall trees is especially important. Large trees affected by drouth, which made poor shoot growth last year, likewise will require heavier pruning.

While pruning may be an aid to thinning and thus save much time and money that would be required in pulling off the fruits after they have set, it is not to be considered a substitute for thinning. Fruits will set too heavily on some branches, and breakage is more apt to occur where uniform thinning is not practiced. By removing a large number of buds in dormant pruning that would otherwise open into blossom and young developing fruits, there is less competition between the remaining young fruits for reserves of food and mineral nutrients. It is common observation that fruits are large on those trees that have had their buds thinned out by a winter freeze. When peach trees carry a heavy load prior to the first crop and thinning of the fruits remaining after this first drop is delayed until the pit hardening stage, fruit size is usually smaller at that time than on trees with a lighter load. Leaf size is also smaller on heavily loaded trees. Small size of leaves was very noticeable during the past season in some orchards where the trees set a heavy crop and where dry weather was prevalent during May and June.

This brings up the question of time of thinning. As already pointed out, the load may be reduced by winter pruning. If the trees set a large number of fruits, it is important that the thinning be done as soon as possible after the first or so-called June drop. Experiments have shown very clearly that with some varieties, particularly the early-ripening ones, thinning before the first drop is over will greatly benefit size. This of course is rather expensive and would probably not be economically feasible on a large acreage. Fortunately, with the Elberta variety if thinning is started soon after the first or so-called June drop and completed within 20 to 30 days, satisfactory size of fruit will be obtained. The number of fruits that remain after the first drop varies with seasonal conditions, tree vigor, and age of tree. In regulating the spacing of fruits on the branches, it is quite important to consider tree size and ability to carry the load to maturity. Where there has been considerable injury to dormant buds and there is adequate leaf area, fruits may be left closer on the branch. Fruit thinning is often considered an expensive and time-consuming operation, but it is essential and should not be neglected. Where labor is scarce, women and high school boys and girls can be taught to do the work. Communities will doubtless be able to work out plans for obtaining the necessary help during the thinning period.

While pruning and thinning are very important factors affecting size and color, we know that moisture supply is of equal importance. This fact was very clearly demonstrated in many orchards during the past year. Even though the ground was quite dry in many orchards during the early part of the growing season and during the period when the fruit was not increasing greatly in size, an adequate supply of moisture during the period of final swell, or the month preceding harvest, was most important in obtaining good size and color. Many orchardists reported during the past season that although the season as a whole was dry, the occurrence of rain at critical times was all-important in obtaining excellent size and color of the fruit.

Adjusting cultural practices so as to maintain sufficient vegetative cover to prevent soil erosion and at the same time maintain favorable moisture conditions for the tree is a problem for many growers whose orchards are planted on rolling and hilly land. Young orchards can be maintained in cover crops with some cultivation along the tree rows. With bearing trees on shallow soils, where a summer cover crop cannot usually be grown unless moisture conditions are favorable, summer cultivation should be reduced to a minimum.

In addition to soil moisture, it is also desirable that peach trees be adequately supplied with nitrogen. The amount of nitrogen to use is generally determined by the growth and performance of the tree during the previous season. Trees receiving a fairly heavy pruning usually respond in growth with less nitrogen than trees of greater size less heavily pruned and bearing a larger crop. For these latter trees more nitrogen must be supplied. Trees that were thought to be weakened by drouth or that showed wilting may have some of the roots in the first foot of soil injured. When this injury is suspected, it may be desirable to supply

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a greater amount of nitrogen in order to insure adequate absorption by the healthy roots, thus invigorating the tree. There are indications that industry requirements for war production may take large quantities of sodium nitrate. Whether there will be sufficient sodium nitrate for the needs of fruit growers for the coming season is not known at the present time. There are indications, however, that there will be sufficient ammonium sulfate, particularly in those states where this material is produced. I believe it has been customary here in Pennsylvania to use ammonium sulfate on peaches and apples. If ammonium sulfate is used, it should be applied not later than 1 or 2 weeks before bloom. If later applications are used in the spring, sodium nitrate is usually to be preferred, since in some seasons there are indications that the more slowly available nitrogen, from the ammonium sulfate, may affect fruit color. If ammonium sulfate is used in the fall or early spring, it seems to be as satisfactory as sodium nitrate.

The variety question is always one of interest. With the relatively short life of peach orchards, there is some replanting every year. Some of the new varieties of peaches introduced in recent years have been given commercial tests, and we are learning more about the possibilities of these varieties.

An early-season variety that ripens ahead of Golden Jubilee is the Redhaven, recently introduced by the Michigan Agricultural Experiment Station. While this variety has not been tested in this region, it does show promise as a commercial variety and is one that commercial growers interested in a variety of that season should watch.

For varieties to follow Golden Jubilee the Triogem has been found quite satisfactory. It has excellent color and quality, but is apt to run a little small. It will require very favorable growing conditions and good culture to produce fruit of size and quality on this variety.

Halehaven and Goldeneast have been tested for some time, and both appear to be very promising midseason varieties.

There is need for a good variety to precede the Elberta season. Of those available at the present time, the Kalhaven appears to have considerable promise.

There is also some interest even this far North in varieties ripening after Elberta. In some sections, Brackett has proved to be a good variety coming in just after Elberta. Hale types such as Halberta and Rio Oso Gem are large, well-colored varieties. For still later ripening, Lizzie and Salberta are both good yellow-fleshed varieties.

Finally, in discussing those factors which are most important in affecting size and quality one can not overlook the importance of timely and thorough spraying to control insects and diseases. During the past season much good fruit was lost from brown rot. Fortunately there does not appear to be any immediate shortage of the spray materials needed by peach growers.

Peach growers are always optimistic, and if they were not they would not long remain in the peach business. It would seem that there is reason for this optimism to continue during the coming year. Peaches are food and growers are called upon to produce an abundance of food of all kinds. with the probable increased demand for fruit for home consumption, home canning, and some export of canned products, all of the peaches produced in 1942 should find a ready market.

WHAT APPLE GROWERS SHOULD KNOW ABOUT GRADES AND VARIETIES OF APPLES—REQUIRED BY THE BY-PRODUCTS INDUSTRIES

M. E. KNOUSE, Arendtsville, Pa.

The subject assigned to me is: What Growers Should Know About Grades and Varieties of Apples Required by the By-Products Industries. If I had been discussing this subject one year ago, I would have asked you to think with me on a single long-range program for our Industry, but today I believe we must approach this subject with two objectives in mind: first, a plan of production and distribution to fit the emergency, and second, the long-range production and distribution. Let me say with reference to the first that it is so close on our heels that for most of us, we can see very dimly.

Our first patriotic duty is to produce to our maximum capacity for fear we will need same. I think each one of us must make this effort. It will be a tragedy to have failed in production if the food supply is needed. The damage will be not nearly so great if we create great surpluses in this production effort. I am sure that at this moment the gamble is in favor of maximum production of all food supplies.

Some of the suggestions I will make for the long-range planning may have to be delayed until the emergency is past. I think, however, it will be a grave error if we permit this emergency to throw us off our course. The fruit industry is a great industry and I believe it has an equal chance with any other agricultural product. Farmers are usually inclined to believe that production is their major problem—that if they produce volume, their success is assured. Many a manufacturing industry has failed by thinking only in terms of production and failing to give sufficient attention to merchandising and distribution.

Therefore, after production comes **distribution**—a major agricultural problem. First, this distribution problem can be assisted greatly if those in the field of production know something about the needs, and likes and dislikes of the consumer. At one time, as General Manager of our Corporation, I had only the production slant, but I found if I was going to have satisfied customers, I had to know something about their needs. In this discussion. I shall try to shed some light on the field of merchandising your product—through the processing channels.

About 20% of your production goes through this channel. This percentage, of course, is higher in Pennsylvania, Maryland, the Virginias, and New York State. 10% (16,000,000 bu.), or one-half of this quantity processed is your lowest grade apples, the ciders for vinegar stock, which has no hopeful outlook unless the volume is greatly reduced. The per capita consumption of vinegar is 1½ gallons per year and this cannot be increased or decreased by the effects of price or merchandising. 4%, or 6,500,000 bu. are dried. 1% or 1,500,000 bu. are used for brandy. 3% or 5,000,000 bu. are used for canned apples, and 2% or 3,000,000 bu. for apple sauce. Apple juice is so new we have no statistics, but it is on the increase.

I would like you to make a mental chart with me. In making this chart, we shall try to show what the varieties and quality of fresh fruit should be to produce a quality that is acceptable to the consumer. We will set down on the left side of this chart a list of varieties which are acceptable for processing. We will then divide them in three groups, as first choice, second choice and third choice.

		Canned Apples	Apple Sauce	Apple Juice	Apple Butter	Evaporated Apples	Brandy	Vinegar
	(Yorks							
1.	(Stayman							
	(Grimes							
2.	(Jonathan							
	(Romes							
	(Baldwin							
	(Black Twig							
3.	(York Stripe							
	(All other Sour Varieties							

I want to comment on varieties. Yorks are the best-all-around variety for processing purposes, excellent in flavor and texture, and have the longest period for being just right. All apples have a place in the degree of ripeness where they are just right. Yorks can b held for months at this stage. Stayman, Grimes and Jonathan have a much shorter time in which they are in perfect condition for processing. We must keep this in mind in processing any kind of food, that it is never any better than when it is put in the can.

A fancy can of apples must always be packed from one variety. Yorks, Stayman and Golden Delicious will produce a fancy pack. All other varieties go for standards. Black twigs make a very poor standard and have a bad odor. Occasionally you have a variety, which if produced in quantity, could go in the fancy group. Changing over from one variety to another in canning is very expensive, costing $69.75 every time such a change is made.

Now a word about apple sauce fruit. Yorks again are tops. The Stayman variety is good but we have considerable trouble with the seed shells coming off when steam is applied, leaving small black specks. Apple sauce, unlike apples, must be of blended varieties. Yorks and Stayman again are tops. Grimes, Jonathan, Rome and Baldwin are good, while all other sour varieties are fill-ins. By "fill-ins" I mean that you can hide about one bushel of poorer varieties to four bushels of good varieties, but a better product results if they are not in at all. Ben Davis is one of the sour varieties which is not suitable for apples or sauce. Apples for sauce must not be over-ripe, as quality is reduced rapidly when they have reached this stage.

Apple juice, I think, fits next in the bracket. I do not have any experience with this product but I know it is also a blended product. Inasmuch as I am not posted on the processing of apple juice, I am going to quote from the Bureau of Agricultural Chemistry and Engineering as follows: "Cider Apples" as they are known in the trade, do not make apple juice worthy of the name. Flavor is what buyers want in apple juice, and the low quality "cider grade" simply does not have the makings of full-flavored, tart, and tangy apple juice.

If the apple industry expects to compete effectively on the packed juice market, it will have to take a leaf from the experience of the tomato juice packers and turn out a high quality product made from ripe fruit of good quality, say juice specialists of the Bureau of Agricultural Chemistry and Engineering.

The apples need not be large or fancy, but they should be ripe and sound. Good apples must go into the press if good juice is to come out. A blend of juice from several varieties is likely to have better flavor than juice from a single variety. Quick handling in pressing and pasteurizing is also important. "Cider Apples" are raw material for vinegar, not for apple juice or even for sweet cider that is to be sold promptly without processing.

Apple Butter is another blended product and can be made from many varieties. Evaporated apples require one variety for fancy stock, but on lower grades varieties may be blended. Brandy is also a blended product. Vinegar takes up all the odds and ends of every description and is the lowest quality of stock used by processors.

Fancy canned apples are peeled, trimmed, seed-celled and sliced into segments of eighths, tenths or twelfths, not larger than quarters, possess similar varietal characteristics; are of uniformly good bright color, are not less than 2 inches in length after processing, and are reasonably uniform in size. They are practically free from defects; possess a firm but tender texture and a normal apple flavor.

Apples for apple sauce must be peeled, cored and trimmed. If they open up with black or molded centers, this must be cut open and removed. The size of the fruit used for apples and apple sauce has a lot to do with value of the apples. In the old days of cheap labor this was not reflected so greatly, but now with high-priced labor, it is an item which cannot be overlooked. 100℔. average, 2¼ to 2½ inch apples will have 530 apples, and will yield .663℔. apple meat; while 100℔. average 2½ inch up apples will have 306 apples, and will yield .745℔s. apple meat. The labor in preparation: 100℔. 2¼ to 2½ inch apples, 1.688 cents per 100℔.; on 100℔. 2½ inch up apples, .867 cents per 100℔. This shows an increased cost for labor of .821 per cwt., plus decrease in yield of 8.2 ℔.

Bad bruises and defects register equally bad. Wormy apples just about have no value in processing, except for vinegar purposes. Decayed apples, I believe, will be prohibited from all uses—even vinegar stock. The Pure Food Department is tightening up on these two defects and no one has much ground for opposing them. Apple butter apples must be kept free from these two defects.

The processor of your fruit is one of the cogs in the system of distribution of your products. I have tried to convey to you what the consumer wants. I believe any lowering of our standard of quality would result only in slowing up consumption. Our slogan to our employees is: "Don't put anything in the can that you would not enjoy on your own table."

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APPLES IN THE CHANGING AGRICULTURAL PICTURE

TRUMAN NOLD, National Apple Institute, Washington, D. C.

Now that we are in the war, and all the way in, we are also moving into a war boom. Prior to Pearl Harbor we had a rising tide of defense spending; now it will become something beyond our power to imagine.

Does this mean all our marketing troubles are over, and that people with money jingling in their pockets will flock to buy apples and everything else?

Well, apples are selling better this season; average returns to growers, according to government figures, are the best in 10 or 11 years, except for 1936 when the crop was way short.

Back in the depression you heard it said, "People would buy apples if they had the money." You heard the reply, "Yes, if they wanted them badly enough. They'll buy now if they want them enough." That reply is what started the apple advertising and promotion organizations on their way.

Ask yourself whether our better market this season is just because we have old customers back, after 10 years, with money in their pockets again. Then consider some of the things that have happened in those years.

They were depression years. Yet some food products gained more and more customers throughout the period. The American breakfast table was entirely changed in that time, for example. How did it happen? Well, one thing that happened was that, as a housewife found less and less money in her purse for food, she spent it more and more carefully. She spent it for those things which were made the most desirable and appealing to her—and that was done by skillful advertising and promotion.

In those ten years our competition from citrus fruits practically doubled. A whole new type of competing foods, the juices—tomato juice, pineapple juice, grapefruit juice—was created and grew into a mighty factor in the food business. Sales of breakfast cereals—to keep you "regular"—bounded upwards. All when the people had less and less money for apples.

We speak of the people, our customers. Are they the same people as those ten years ago? Let's see. Marriages have been taking place at the rate of nearly a million and a half a year. That's three million people. In ten years that's thirty million; with the children that come along, that's a third of our whole population.

Those consumers are entirely new in the past ten years, new as far as food buying and apple buying are concerned. A third of our population now does not represent old apple customers or old food habits; they are new family buying units. The notable thing about this new generation of buyers is that it is the first to be influenced chiefly—not by mother's kitchen at home—but by advertising, by new merchandising techniques, by the radio and the food pages of the magazines, and all the other methods of education and promotion.

Fortunately, apple growers lately are seeing to it that apples do not pass unnoticed in this food parade. And this matter of attention to what influences our customers will become of increasing importance. This new one-third of our population will become two-thirds in another ten years.

Yes, buying power is a mighty important ingredient in a good apple market—it's like flour when you want to bake bread. You have to add a little of the yeast of advertising to get the best results.

Is our task, then, simply one of insistently repeating "eat apples," over and over? Not at all. That does not get us very far. We learn as we work at this job of bettering our market that there are two principal points of attack.

The first of these is the question of the physical value of the fruit as it reaches the consumer. It's what the apple is worth then that counts in the long run. The lady shopper at the counter in the grocery store doesn't care how nice the apples were when they came off the tree, if they are bruised and beaten and a sorry sight in general by the time she gets to them. If she will buy them at all, she will pay no more than what they are worth in that condition.

I suspect that the most serious part of our cull problem lies right there—in the apples which were good at picking time, and take so much ill treatment that they are actually culls by the time they confront the consumer.

Every apple that can be saved from the garbage can; every apple that can be kept close to its original condition, represents an increase that can be paid the grower.

There is no single fault to blame, no one cure; there must be little improvements at every step clear down the line. It is up to the grower so far as the fruit is under his control. When it goes out of his hands through the channels of trade, it is an organization job.

It is common knowledge in the grocery business that apples nowadays are being handled more skillfully in the stores. The basket of apples is coming out from under the counter, up off the floor, displayed at eye level. The clerk who throws them around like baseballs gets a talking to. Careful handling, building of attractive displays, position of displays away from the sunlight and heat radiators—a hundred important little details—are getting the attention of retailers. As this goes on, the apples in the market will continue to look better. They will be worth more.

The second point of attack is the "idea value" of apples to each buyer. That is, what the buyer's idea of what an apple is worth? What pleasure and satisfaction will be given? Is it good for the children? Is it easy to cook and prepare? Does it go well with other foods? Anything that goes on in the mind of Mrs. Housewife as she makes her selection of fruits and vegetables is important to us.

To assume that she knows all that we could tell her about apples, or to expect that someone else will take the initiative in telling her, is out of the question. And to indulge in the kind of advertising and promotion which consists of ballyhoo, bunk, and deception—which some folks think about when advertising is mentioned—would be the worst kind of folly and an injustice both to our product and to our customers.

We are seeking to have more and more said about apples and whatever is said, to have it ring true.

By any measure of effectiveness, the best way to go about it would be to buy our own space in the magazines, time on the radio, and so on, to tell our story for ourselves. Some of the regional organizations are able to do that in a limited way. But lacking ability to do it on a big scale nationally, we turn to the second-best way.

A number of other food advertisers have seen where they could include apples in combination with their product to advantage. This year has brought more of such combinations than ever before. You have seen examples in your own magazines, at home—apples in Gold Medal Flour ads, Pillsbury Flour, Wheaties, Meat Institute advertising, and so on.

The national magazines especially those catering to women, have been generous with the space devoted to apples on the food pages, so have the food pages of newspapers, whenever appealing copy has been furnished them. The retailers have been very cooperative.

As I see it, we must seize every opportunity during this boom period to consolidate our position, realizing that the nation's economy now is fundamentally a temporary was condition. There is no substance and soundness to the flow of money for the tragic purposes of war. Sooner or later, the piper will have to be paid. When the guns stop firing there will be such a strain on our economic system as it has never had to withstand before.

One reason the apple industry had such a difficult time during the ten years past was that it was in no position to act, as an industry, to meet the changing conditions when the nation's economy took a nose-dive. Today we can say that respectable progress has been made. Whatever form the economic strains ahead may take, we are going to meet them with a strength and resilience which were not there before.

ABSTRACT OF CHANGES IN CONSUMERS' TRENDS AND WHAT THEY MEAN FOR THE APPLE GROWER

PROFESSOR V. R. GARDNER, Director, Michigan Agricultural Experiment Station, East Lansing, Michigan

Almost unawares, because imperceptibly, certain changes have been taking place in the consuming habits of the American public that vitally affect the business of the apple producer. An indication of the direction of those trends and also affording some measure of their magnitude are the following figures:

A generation ago the per capita apple consumption in the United States was about 100 pounds per year. It has gradually dropped to about 60 pounds annually during the last few years.

In 1920 California shipped out 60,000 carloads of citrus fruits. In 1940 it shipped out 120,000 carloads.

In 1932 Texas' production of citrus fruits was slightly less than 2,000,000 boxes. In 1940 it exceeded 20,000,000 boxes.

These and other facts and figures that could be cited for Florida and Arizona citrus fruits and for importations of bananas and pineapples indicate that the real competitor of the Pennsylvania apple growers is not the New York or Missouri or even the Washington Apple Grower but the citrus growers of Florida, Texas and California.

Further evidence supporting this conclusion is supplied by what is happening every day in the food stores of the country. Today in Harrisburg U. S. No. 1 Pennsylvania-grown apples are being retailed at 3½ pounds for a quarter, U. S. No. 1 Florida oranges at 5 pounds for a quarter and U. S. No. 1 Florida grapefruit at 5 pounds for a quarter. The housewife who enters the store to make her purchases can take her choice. It is pretty likely to be in favor of the product with the greatest appeal to the eye. If the apples are a bit under colored, variable in size and shape, if they show a good many bruises, in brief if they are below par, they are left on the shelf and the oranges and grapefruit are purchased. This is corroborated by the experience of chain store system buyers and super-market operators. They say that when they have really fancy, highly attractive apples to sell, not only do they sell them in larger volume than oranges and grapefruit, but they can and do sell them at higher prices and the citrus fruits must be priced in proper relation to them in order to be moved. On the other hand if the apples are below par, it is the citrus fruits that set the selling pace and set the price and the apples must be **priced down** in order to sell at all. The competition that the apple grower must continually meet in the retail market, therefore, must be met, if met at all, by a higher grade product—not merely a high grade product but a really fancy product.

What the situation is in Pennsylvania, I do not know, but in the general run of commercial orchards in Michigan only about 50 to 55 percent of the crop that is harvested meets the requirements of the **U. S. No. 1** grade and a much lower percentage the requirements of a **fancy** grade. That isn't enough. Eighty or even ninety percent should meet U. S. No. 1 grade specifications and 50 percent should be fancy. That this objective is neither impossible nor impracticable is attested by the records of a number of our best growers. Furthermore they are attaining these standards of production without unduly increasing their production costs. Often the use of one spraying schedule instead of an alternate one results in a great difference in "finish" of the fruit and a corresponding difference in percentage of Fancies. Or the proper use of fertilizer or of a certain stock on which to grow a certain variety will make a corresponding difference. Pruning of the right kind will often **greatly reduce** the percentage of the Number 2 and cull grades. From the day the orchard is set until the fruit is packed, production and handling practices must be geared to the production of a truly fancy product if the increasing competition of the citrus grower would be successfully met.

A significant trend in the consumption of certain other fruits, notably the orange and grapefruit, points the way to another lesson that the apple industry needs to learn and act upon. Reference is made to the great increase in demand for juices, as compared with the fresh fruit itself. Probably more oranges and grapefruit are being drunk today than are being eaten. This trend extends even to the pineapple, tomato, papaya and still other fruits. Experimental studies have shown that apple juice, properly made from clean, sound, good quality (though not necessarily fancy or even U. S. No. 1) fruit can compete successfully with those other juices as a cocktail and for general beverage purposes. This outlet, potentially very large, has not been developed. It is the apple growers natural outlet for that portion of his crop that does not meet U. S. No. 1 grade specifications. It is, however, an outlet that must actually be developed, for it will not develop itself. The job of developing belongs to those engaged in the industry.

OUR CHANGING FRUIT INDUSTRY

By H. A. ROLLINS, Extension Fruit Specialist, University of Connecticut, Storrs, Connecticut.

Although this may seem to be a rather broad subject that might have been appropriate at most any time in our history of fruit growing, I feel that we are facing some very important changes now. Probably the most important of these changes has been the loss of export markets but alert growers are already making adjustments to meet this change.

We have seen the shift from tree fruits grown as part of a general farm enterprise to the highly specialized orchard unit. In New England the apple crop from the farm orchard of 100 trees has, in the past, paid the annual taxes on the farm. In recent years such a block of trees has been a liability rather than an asset on the farm, because of the necessarily complicated spray program. In other words we have seen the fruit growing business in general become highly specialized and only the most efficient orchard managers can succeed.

I don't want you to get the impression that fruit can be produced efficiently only on specialized fruit farms because I know of many combination farms where the fruit part of the enterprise is highly successful. On each of these farms, however, we find that there is first, an orchard unit large enough to be operated economically and second, a good fruit man in charge.

According to recent surveys, McIntosh have been heavily planted in the New England area in the last 20 years. The cold winter of 1933-34 caused serious damage to Baldwin but very little to McIntosh apple trees. Today we have a tendency toward a one-variety area and that variety is McIntosh. This might be better understood if I were to explain that in 1925 Connecticut was producing about five times as many Baldwins as McIntosh and in 1940, only 15 years later, there were a few more McIntosh than Baldwins produced.

With 37 percent of the McIntosh trees under bearing age in 1940 and only 15 per cent of the Baldwins in this age group, it is not difficult to forecast the probable future of these two varieties. According to information obtained during the 1940 Connecticut Orchard Survey, the growers with larger acreages had the most young apple trees. In other words, the growers with small acreages had not planted enough trees in the last 10 years to maintain production. The signs point toward fewer but larger orchards in New England. Less than 3 percent of all apple trees in commercial orchards were over 40 years old. This last figure was encouraging because, in Connecticut, we feel that apples cannot be produced economically on old trees.

A conservative estimate of Connecticut apple production in 1950, based on present tree population, shows about 10 percent increase in total apple crop. The probable increase in McIntosh will be about 35 per cent and the probable decrease in Baldwins about 25 percent. It is evident that even Southern New England is fast becoming a McIntosh producing area.

The freeze of January, 1934, and the hurricane of September, 1938, have had some direct effects upon the fruit industry in New England. The most noticeable effect of the 1934 freeze was the tremendous loss of Baldwin trees throughout the area. The hurricane, which caused the most serious damage in eastern Connecticut, Rhode Island, and eastern Massachusetts, affected both the apple and peach industry. Peach trees over three years old and apple trees over 30 years of age, were severely damaged by the hurricane. In general apple trees under 30 years of age have responded to good treatment and have recovered in the past three years much better than was expected. Some orchards which had 75 per cent of all the apple trees blown over and the roots exposed in 1938, after receiving good care produced a normal crop of fruit in 1941. We have weak trees scattered through some orchards that will have to be removed as a result of the hurricane damage; but, in general, the loss is less severe than we had anticipated.

Pears are not an important crop in the New England area. Our commercial production is limited to a few growers and there is no indication of great expansion.

Peaches have been on the decline, especially during the past 10 years, because of three principal reasons: winter injury, low retail prices and the X-disease. We think we have learned to live with the Oriental peach moth by using parasites. With somewhat better prices during the past two seasons, there is a slight interest in peach planting at the present time.

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The orchard survey in 1940 showed 43 percent of our peach trees less than four years old. Elberta is our principal variety, although Golden Jubilee and Halehaven have become popular in recent years.

Strawberries are about the only small fruit that we grow commercially in Connecticut and there has been an increase in strawberry production in recent years, largely because of the development of auction markets.

Considering cultural practices for our tree fruits, I think there is considerable similarity between southern New England and Pennsylvania although perhaps our commercial varieties are not the same. In New England there has been quite a change in our pruning practices since the freeze of 1934. Previous to that date, growers made good use of warm days in December and January to get some of their pruning done. Because of the serious winter injury on trees that had been pruned before the January freeze of 1934, our growers now hesitate to do much pruning until at least the first of February. Such a program is likely to be extremely difficult now that there is a shortage of labor.

Some growers have taken advantage of the favorable marketing conditions and have moved most of their fruit into market earlier than usual so that the regular labor will now be available for pruning. There has been a tendency toward more detailed pruning, especially on McIntosh and a tendency to follow a modified "Thinwood" pruning program. By this I mean that our growers have been trying to remove weak wood and leave the more productive wood in the tree. Judging from present conditions, I feel that New England growers will have to slight their pruning this year because of the labor situation.

In our fertilizer program there has been a tendency for us to supply some form of nitrogen to our trees and to use lime, superphosphate and potash for the orchard cover crop. Fruit growers have been aided by the Agricultural Conservation Program which made it easier to obtain lime and superphosphate. It is likely that some of our orchards have been over-nitrated during recent years and that the use of less nitrogen this year, since we may not be able to obtain it, may not be particularly harmful to our apple trees. Growers are already beginning to make more use of hen manure as a source of nitrogen for the orchard. There is an apparent increase in poultry production in our area. Our county agents are attempting to obtain information about the availability of hen manure and the fruit growers who would like to obtain it.

We have had some trouble with boron deficiency in our orchard soils resulting in internal cork, especially on McIntosh and Cortland apples. This was most apparent during the dry season of 1939. Borax was applied to the soil the following spring and we have had no trouble since. We are, however, advising the use of Borax again this spring, as insurance on soils where internal cork was a problem in 1939.

I believe our orchard soil management program in southern New England is similar to yours in Pennsylvania. I will not attempt to go into detail on this subject except to explain that most of our apple orchards were planted with peach fillers and were rather generally cultivated for the first 10 years while peach trees were there. We have had a problem of reseeding to obtain a satisfactory cover crop in these apple orchards after the peach trees were removed. During the past five years we have been favorably impressed with a mixture of orchard grass and Ladino clover as an orchard cover crop that has given excellent results. In some cases we have found a straight Ladino sod to be very good but perhaps it is a little safer to have a mixture containing orchard grass. Our growers who have good stands of Ladino clover in their apple orchards are inclined to feel that it is like money in the bank. If it becomes difficult to obtain nitrogen for orchard fertilization, they should be able to carry their orchards through better than the fruit growers who have a nonlegume cover.

In the northern New England area trees are often planted in sod and no attempt is made to cultivate. Where this is true fruit growers are usually satisfied with a strong growing grass sod that is maintained by a broadcast application of fertilizer.

New England fruit growers have agreed, at their winter meetings this year, that they will make every attempt to follow through a detailed spray and dust program for pest control. They realize the necessity of producing clean fruit and will make every attempt to do so in 1942. I believe one of the main differences between your pest control program and ours is the codling moth program. In most of New England codling moth is a very minor pest, but it appears to be on the increase throughout the area. Apple maggot in turn is our number one enemy, with apple scab, perhaps, a close second. Our growers are following a wettable sulfur spray program and only use liquid lime sulfur as an emergency spray. Most of our spraying is done from the tank.

Several growers with small acreages, are adapting their spray equipment so that one man can drive the tractor and spray from the tractor seat. We find that more growers are using dusters as a means of meeting their labor shortage and speeding up their pest control program. Our growers are most concerned about the loss of experienced men who can

operate spray equipment effectively. We feel that a good man can do a reasonably good job of spraying with ordinary equipment but that an inexperienced man may do a very poor job of spraying with the best equipment. In other words, we feel that the man who actually does the spraying is one of the most important men in the whole orchard crew.

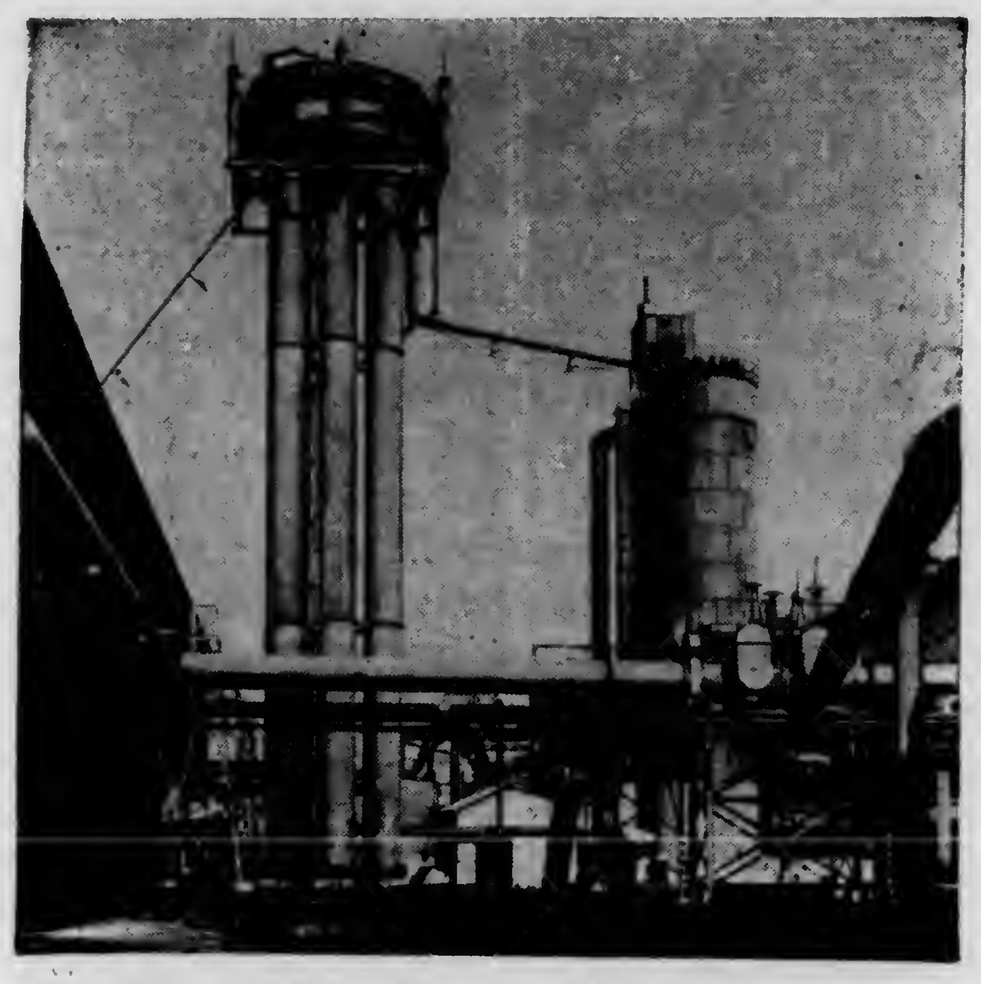
We have made some use of harvest hormone sprays, especially on our McIntosh apples. Most Connecticut growers feel that there is not a need for harvest sprays every year. Some years we have a serious drop problem with McIntosh, and , perhaps, in years when we have a harvest labor problem such as we experienced in 1941 and anticipate in 1942, there will be a need for harvest sprays to hold these apples on the trees for a few days longer.

With the increased production of McIntosh, a variety that is very easily bruised, our growers have been trying to find ways and means of picking and handling this fruit to prevent too much bruising. General use has been made of the metal side picking bucket with false canvas bottom and some use of the metal picking pails has also been made. However, we have found again that the person who picks and handles the fruit is more important that the container he uses.

This past year when we had to use school boy labor, part-time labor from defense plants and anyone whom we could interest in picking apples, it was necessary to use most any kind of a container as long as we got the apples off the trees and into the cold storage. As a result of using inexperienced labor, we have had a serious problem with bruising of the 1941 crop.

Realizing that Mrs. Consumer does not like bruised apples, we are still stressing the need for careful handling of fruit even in these difficult times. We had Professor Vierheller of Maryland at our last annual meeting to tell us how Maryland growers were meeting this problem. It might interest you to know that we have farm cold storage capacity enough to hold about 70 percent of our commercial apple crop in Connecticut and that most of our fruit is stored orchard run in crates and packed fresh for sale, during the winter months. Most of our fruit is graded by hand rather than by mechanical sizing machines to prevent the bruising that occurs on McIntosh, especially after it has been held in storage for two or three months.

The question of containers has been a live topic for argument in the New England area for several years. At the present time we are using practically no bushel baskets and over 90 percent of the crop is sold in boxes. A surpris-



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PITTSBURGH, PA.

ing amount of our 1941 crop was sold in used boxes because of the difficulty in obtaining new containers. Most of the new boxes purchased for the 1941 crop were 1⅛ bushel size while practically all of the used boxes that were purchased were 1⅕ bushel. We are already anticipating difficulty in purchasing new boxes for the 1942 crop and we are trying to work out a solution. A number of growers are now buying used boxes for next season.

Although I have not attempted to discuss marketing this morning, I would like to mention that New England growers as a whole, appreciate the good work of, and realize the need for, the New York and New England Apple Institute. With the competition that we have and can expect in the future from other fruit, every apple grower should do his part in supporting his local National Apple Institute.

I believe we are all interested in what is happening in other fruit sections so I have tried during these few minutes to tell you something about the New England and especially the Connecticut fruit industry. This is not a large producing area but we do try to grow clean apples.

In brief there is a definite trend toward a heavy McIntosh production and light Baldwin crops. The hurricane damage of 1938 was largely on old trees. It is evident, that because of a labor shortage, many New England orchards will not receive their usual pruning this year.

Southern New England fruit growers are enthusiastic about Ladino clover and orchard grass for an orchard cover crop. There is increased interest in the use of hen manure as a source of nitrogen for fruit trees.

New England growers will make every attempt to apply the usual spray and dust program in 1942 for insect and disease control. The loss of experienced labor on the farm is handicapping fruit production in New England.

With increased production of McIntosh we realize the need for more careful handling of fruit to prevent bruises. In Connecticut we have farm cold storage capacity for about 70 percent of our commercial apple crop, and considerable fruit is sold as a fresh pack from the storage during the winter months.

ORDERLY MARKETING OF FRUITS

R. B. CORBETT, Director Maryland Agricultural Experiment Station

The marketing problem has become constantly more important to the American farmer. Not many years ago the farmers of the United States sold little of what they produced and bought little of what they needed. Theirs was a self-sufficient type business, and their prosperity depended primarily upon their ability to produce their own needs. If anything was sold, it was sold at the price offered by some local buyer, or sold in exchange for some article that was needed on the farm or in the farm home. In recent years all this has changed, since most farmers have become specialists. Virtually all of what they produce is sold and the question of prices and methods of selling has become exceedingly important. Along with this, of course, practically everything that is needed for the farm and farm home is purchased. Thus the farmer has found himself more and more a part of a world that depends upon ability to buy and sell, or in other words, to market successfully the things he has produced, and to buy successfully the things that he needs.

The problems involved in these changes have been intensified by the fact that over the past couple of decades, the costs of marketing have increased while the costs of production of most agricultural products have decreased. Thus the "incidental"—marketing—which means placing the production of the farm where it is wanted, when it is wanted, and in the form in which it is wanted, has become more expensive and inefficient, while the "fundamental"—production—has shown marked improvement in efficiency.

A vivid illustration of this point was brought out by a group of apple growers at a recent meeting, on the "Del-Mar-Va Peninsula". Through discussion this group decided that the cost of producing a marketable bushel of apples was 45 cents. They further decided that they would arbitrarily say that production ends when the apples are ready for picking, and that marketing begins with picking, and extends to the placing of these fruits in the hands of the consumer in New York City. They included every step from the tree through grading, storage, hauling to market, the city markets, the retail stores, and finally to the consumer. The costs that they decided upon from the tree to the consumer totaled $1.71. Thus the costs of marketing were many times the costs of production. This illustration is as true for vegetable growers as it is for fruit growers. No group in the country is as interested in the costs of marketing as is the farmer. In general, we say that supply and demand sets the price at the point where the consumer buys and that the farmer gets what is left from this price after all the costs of marketing have been deducted. Thus, if the costs of marketing are increasing, the net price received by the producer is, by the same token, decreasing. This is a fundamental problem. What can we do about it?

A program to move crops in periods of glut is one step that might be undertaken. In the past it has often been a

fact that retail prices have not fallen as the season progressed as have wholesale or farm prices. Usually a vegetable product, for example, will sell at the beginning of the season at a high price. As the volume of production increases, the farmer's price drops rapidly. Many times the retail price continues at a fairly high level. This is economically unsound; it benefits neither producer nor consumer, and anything which will change this situation holds promise of benefit to all concerned. The plan in general is: If producers forecast a glut of some product 10 days to 2 weeks in advance, the retail stores will develop a program to move this glut into the hands of the consumer. The radio will be used to let people know that this product will be available in large supply and at low cost. Newspapers will be used to tell the same story, and it is expected that the clerks in the retail stores will cooperate in calling the consumer's attention to the excellent supplies at low prices. The stores will reduce their spread and move the product into the hands of consumers at as low prices as possible. This is not a "loss-leader" campaign since it is expected that the increased volume of sales will carry the costs involved. The results will be that the consumer will get products at a low price during the period when in the past they have been thrown away because of the glutted conditions. The producers get something for their products as compared with nothing. This type of cooperation gives promise of valuable results.

In Maryland we have been working with this plan for a few months and have gained some valuable experience. We must know the exact time that a glut will come on to the market, and must have some idea of the quantity that will be available. Monthly crop reports are not sufficient. There must be cooperation from the producers in furnishing information at shorter intervals of time. For example, hot weather and disease can eliminate what appears to be a heavy glut, in a few days' time. Thus, information on production conditions must be followed closely during the period just prior to the expected glut. We have found that in general the trade, particularly the retail stores are willing to cooperate and push sales in periods of glut. It appears that one of the factors in the success of such campaigns is the ability to get consumers not only to purchase but to purchase larger quantities during the glut period. It may be that under war conditions, there will be a revival of interest in home canning. If so, this will help materially in increasing consumers' purchases at the time of glut. Such a program does offer real promise of improvement in our marketing situation.

Such a campaign was conducted this past season in the sale of peaches. Retailers in the City of Baltimore were asked if they knew about "Maryland Peach Week", which was the name of the campaign. Seventy-four per cent stated that they did. It was asked if the Week hit the correct peak period. Eighty-eight per cent said "Yes". Only 37 per cent heard any of the broadcasts over the radio. This was undoubtedly because the men were working at the time of the radio broadcasts. The broadcasts were, of course, aimed at consumers rather than market men. Sixty-three per cent said that they saw newspaper releases. In this connection it was asked if there was sufficient publicity, and 56 per cent said "Yes"; 16 per cent said "No". Peach advertising banners were distributed to the retail stores. The men were asked if there were enough of these banners. Thirty-five per cent said "Yes", and 23 per cent said "No". Another question was, "Are you in favor of running special sales campaigns?" One hundred per cent said they were in favor of such campaigns. Another question was, "Were your peach sales increased during "Peach Week?" Eighty-three per cent said "Yes". If the answer was "Yes", "To what extent were these sales increased during "Peach Week"? These replies varied from 25 per cent to 200 per cent. It was also asked, if the peach sales held up prices, and the reply was "Yes, from 5 per cent to 25 per cent." These judgments of the retail trade would tend to give us considerable confidence in our belief that such campaigns can be beneficial to producer, consumer and to the trade.

It is difficult to analyze what will happen in the months just ahead of us. It is very possible that in spite of price control, price of food products will advance much more rapidly than the wages received by certain groups in our city population. This may be particularly true of the so-called "white collar" people who work on salaries such as the very considerable group of persons that do the clerical work of the United States. All that is being said about nutrition and vitamins is tending to increase the use of the so-called "protective" foods, and fruits and vegetables are in this class. From the point of view of national welfare it is important that the white-collar groups and the lower income groups in the United States should eat more fruits and vegetables. Thus nutritionally, we will need not only our Grade 1 products but there will be a place for Grade 2 and Grade 3 products which will sell at lower prices. We must use a greater part of our total production, and it is important that the low income groups have a chance to buy fruits and vegetables at as reasonable a figure as possible. It must be recognized that certain classes will not and cannot pay high prices for fruits and vegetables. It must be recognized that when the price is raised above a certain level, whole groups of our population are eliminated from taking part in the consumption of these products.

An illustration from actual experience, which brings this point home was that told by the manager of one of the largest fruit and vegetable farms in the east. He said he went to one of his fruit packing houses one afternoon when peaches were being packed, and found the packing-house manager selling the lowest grade of soft peaches to truckers for 10 cents a basket. A superior grade (fruit which was more firm but misshapen or had imperfections) was being offered for sale at 25 cents a basket, but was not moving. He ordered his packing-house manager not to sell another bushel of the 10-cent grade until he had cleaned up the 25-cent lot. The next day at about the same time he returned to this packing house and found that no one had purchased the 25-cent peaches. Sitting on the fence in the back of the packing house were 9 or 10 of the truckers who had been buying the 10-cent peaches. He went to the packing-house manager and asked what the difficulty was, and he was given the reply that the truckers would not buy the 25-cent product. So he went to the truckers and asked them what was wrong. He told them that the peaches he wanted to move were a much better product and easily worth 25 cents. They finally got it across to him that they had been paying 10 cents for soft peaches and selling them for 25 cents to the poorest class of consumer in the nearby cities. These consumers would pay 25 cents, but no more, for peaches. When they as truckers, had to pay 25 cents and had to get 15 cents a basket to make a day's pay, their customers were eliminated because they could not pay 40 cents for a bushel of peaches. Naturally from that time on he let them buy the product that they could sell. I know of no more vivid illustration of the fact that there are great numbers of consumers who cannot pay more than a bare minimum for food products and that when we throw away all the misshapen and injured products we do not necessarily raise the price for the whole crop. We may lower it by eliminating certain buyers who could afford to pay enough for the inferior grades so that some additional income would be received by the grower. This angle of the grading problem and elimination of low-grade products needs careful analysis and study.

In addition, it seems certain that labor will be the article most difficult to obtain on American farms during the coming season. This will mean that more exact grading will be difficult to accomplish if not impossible. With the great demand for food. we must know more about what is wanted both as to quality and price. It seems likely that growers close to market, such as the men in the eastern states, can sell a larger percentage of their total production than ever before. The grades that they may have discarded in the past decade will find a demand at prices which will tend to increase their net income.

The present situation changes our point of view on roadside marketing and direct consumer sales. It has seemed wise during the depression when there was abundant labor, and farm prices were exceedingly low, while costs of marketing remained high, that eastern farmers should sell as much of their produce direct to the consumer as possible. Roadside markets have grown up throughout the east. Now, with the labor shortages, with unquestionably fewer people using automobiles because of the gasoline and tire situation, drastic adjustments by many eastern growers will have to be made.

Another program which deserves the attention of everyone, but is again of particular interest to growers, is the improvement of terminal markets, in practically all of our great cities. It is a fact that it costs more to move products from the city line to the consumer than it does to produce the products and move them from the farm to the city line. Thus we might well center much of our attention upon improving the terminal market situation.

Practically all of these markets were built for the conditions of one hundred years ago, before the first automobile truck had been conceived, and before there was any great movement of fruits and vegetables into our city areas. Thus the set-up is one which is not fitted to modern conditions. A few of the weaknesses of these markets are: (1) There are often several market places in a single city. Some wholesale distributors maintain as many as five different locations so as to be represented in the important markets in their city. This is a multiplication of overhead and labor costs. From the buyer's point of view it means a great deal of additional travel, since he may have to go to three or four different markets to obtain the supplies he needs for his day's sales. When you multiply this inefficiency by hundreds of different individuals or establishments, it is clear that this in itself is a great factor in the high cost of city marketing. (2) Many of these markets lack direct rail connections. It is estimated that in several markets the cost of hauling from the railroad to the salesroom would pay for the finest facilities that the city could desire in less than a two-year period. (3) In general, the facilities provided are inadequate. Streets are crowded and trucks stand for long periods of time at crowded corners, unable to move because of congestion. Someone is paying for the use of the truck and for the labor that is sitting on that truck as it stands there awaiting a chance to move forward. Storage facilities are inadequate. It is not uncommon for market men to use railroad cars and pay demurrage so that they can store their goods. With the great shortage of rolling stock on our railroads, this practice will undoubtedly be eliminated by governmental action, if it is not eliminated by volunteer action of the wholesalers themselves. In general the congestion and lack of facilities make city markets a hotbed for the development of rackets, such as useless holding and loading charges that pyramid the costs of marketing. All of these weaknesses are accentuated in this period of emergency. It would seem that this may be the time to act. That in this period of so much interest in the nutritional needs of our population, that in this period when meeting these needs is dependent to a considerable extent upon the efficient movement of food products from the farm to the city consumer, that in this period when labor is in such great demand, and that in this period when everything should be done with the maximum efficiency and at the least cost, it would seem that a program for improving markets has a real chance of success. If, because of the shortages of building materials this program cannot be put into effect now, it would seem wise to work out the details of plans that might be put into effect after the war, and at the time when labor is being released from war jobs. All fruit and vegetable organizations might well include such plans in any program of action which they establish.

Advertising has been thought of by many as a cure-all for the ills of agriculture. We must constantly keep in mind that as all products become more and more advertised, they are adding one more cost in the marketing process. Per capita consumption of all food products cannot be increased. It is true that the product which is particularly well advertised, and which gets its advertising started before its competitors, may make large gains. These gains will force competitors to enter the field and gradually offset these gains. There is little doubt, for example, that the consumption of apples has been harmed by the increased consumption due to advertising of citrus fruits. Apple growers have been forced to enter the field of competitive advertising and sales promotion. There is growing activity in such program on the part of fruit and vegetable growers everywhere. It seems to me that advertising of a general nature may not accomplish the job that apple and vegetable growers wish to accomplish; that the control of specific brand names and that control of the general situation under which the product is marketed, is important to the success of advertising programs. Growers want to be sure that action taken in this field to maintain our markets, is efficient and will accomplish the job.

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THE SMALL THINGS FRUIT GROWERS FORGET

HARVEY RAFFENSPERGER, Arendtsville, Pa.

John Ruef, our State Horticultural Association secretary, is a better man than I gave him credit for being, because he picked on a little man to talk about little things.

The best advice anyone can give to any fruit grower is, **"Do or Don't"**. By that I mean simply this: **Do** take care of your trees, or **Don't** do anything and especially not all the big things and forget all the little things.

It has been my good fortune to get around to a large percentage of our fruit growers in Adams County and in some of the other counties and the little things I wish to mention here are not what might happen, but are things I have actually seen and heard.

I have often heard people say, "I am going to buy fifty acres of ground and plant some fruit trees." When you ask them, "Who is going to look after them?" they will say, "You will not need to have anybody look after them until they start to bear fruit." Now they forget or never knew that the little tree they planted must be pruned to make a strong frame, as this start is the foundation upon which it will be expected to grow fruit and carry a heavy load. If this is not done it will probably never make a strong tree.

Then we have these little mice, groundhogs, borers and rabbits, etc., anyone of which can destroy a lot of trees. The trees they cripple are nearly always a liability. Have you any idea of how much damage they actually do? Well, you would be surprised if you could get a true picture in a whole county.

I believe a simple process to follow in the growing of these little trees would be to treat them very much as you would a human body. If this little tree is well cared for, it will some day bear fruit and then we have more troubles because we have not only the tree to care for but also the fruit.

Now we have information available to control successfully most of the little pests and also the diseases; but it is amazing to know how most of the little growers and a lot of big growers misuse this information and how by forgetting the little things they make themselves a lot of big problems.

How many of you growers spend hours getting this information and then more hours deciding what materials and amounts you should use for your own problems? I daresay most of us spend a good many hours. Then we drive out to the spraying crews and instruct them to use 2 gallons of L.

& S., 3lbs. arsenate of lead, 4 oz. manganese sulphate, 1 pt. nicotine, etc. We then drive away. At quitting time, we ask the same fellows how many trees or acres they sprayed and how many gallons of material they used. They will probably tell us, and we will say, "You did not get far enough with that many gallons."

Now we gave them all the big things, but how about the little things? I have seen sprayers started in the spring and several days of precious time wasted because sprayers were put away with a little pressure regulator stem, valve, hose connection or spark plug in poor condition. Usually the men will say, "That was bad last fall and the boss must have forgotten it."

Do we know if each tank receives the amounts of materials we instructed? Do we know how these materials were mixed? Do we know if they were put into the spray tank properly? Do we know if all the trees sprayed were well covered? Ninety-five time out of every hundred the answer would be a big NO. Now let's do like Al Smith—look at the record.

I have been in a lot of orchards where spraying crews were operating and heard John say to Sam, "Did you put in the arsenate of lead?" "Yes, I put in that one bag." Only one?" "Yes, I thought you put in the balance." They could have saved the one bag.

I have seen spraying crews weigh or measure out all the materials and dump them all in the spray tank at one time, and then smoke cigarettes or pipes till the tank was full of water. To know what is wrong with that, you need only take these chemicals and put them together in a bucket and see what happens.

I have seen sprayers filled almost full of water from overhead, then heavy oil emulsion placed in last and sprayer moved into the orchard. The men took down the guns, the driver cranked the engine and immediately the men started spraying. The consequences—the first trees sprayed receive water and the last trees receive all the oil. The trees are severely damaged, but the material gets the blame.

I have seen and heard crews arguing as to which row they were in or where they had stopped the last time, indicating that they might have missed some trees. When trouble shows up during the summer, again the material gets the blame.

I have never seen many men over-spraying fruit trees unless they got paralyzed in the legs and arms. Then most of the over-spraying was done in one spot.

If we correct a lot of these little mistakes, we won't have so many big ones to worry about.

The one big problem a lot of growers have is with the little codling moth. If these little things I have just mentioned are corrected, that problem will not be so big. A little thing each grower can do to help is to put a few bait pails in his orchard so he will have some idea when to spray and not do like a lot of growers, spray because John Jones is spraying. He may be spraying for anything but codling moth.

I have often heard peach growers say, "I guess it is time to spray my peach trees. I see Brown was spraying today." But he has no idea when Brown sprayed his peach trees last time and hardly knows when he sprayed his own. The results—oftentimes the peaches are covered with scab and brown rot because the sprays were too far apart for the amount of rainy weather. The little thing missed there was a pencil and paper to put down the date of previous sprays.

I hear cherry growers complain about brown rot and leaf spot when they have rainy weather just before or during harvest time. They say the trees are planted too close to get the sprayer through and the trees too thick to get good coverage. Well, a little more ground at planting time and a little more pruning in the winter to let a little sunshine in might help a lot.

Too much of our fruit is picked and packed in a bruised condition because of little things we neglect—bad picking equipment, crates in poor condition, fruit handled roughly in hauling, owners driving their own trucks and help left to themselves in the orchards. Now the growers packing their apples could improve their pack if they would remember one little suggestion. Don't be afraid to have a little drop and improve the color of fruit remaining on the trees. Why, you can even sell a Ben Davis if it is red because the consumers make themselves believe an apple is good because it is red.

We pack this fruit after many months of strenuous effort to have it perfect, but so many little things can happen to it. Most of the growers have learned to throw out the large blemishes but too many have not learned how bad that fruit looks in a package with a lot of little blemishes. If every fruit grower had to sell his own fruit on the market after he had packed it himself, I believe he would be willing to correct all these little mistakes and keep his fruit in good, clean containers.

If you go to your grocery store to buy canned goods and you receive cans with soiled labels, you will take them back because you think the contents of the cans are very old. What about the apple consumer when he buys your apples in containers which were kept in chicken-houses or other places that are not clean? Don't you suppose he might be afraid the contents of the container might not be clean.

There are a few little things the American consuming public demands—a nice label and a good clean container with good quality fruit inside. Unless we give them that, we are only defeating ourselves.

We could remain here and spend hours on these little things, but wc have more speakers with just as important subjects. If you are guilty of any of these little mistakes, go back home and try to correct them. But that is not all, work on your neighbor to do the same and see if your big problems—other than your income tax—are not less next year.

CHANGING PRODUCTION PRACTICES TO IMPROVE THE FRUIT INDUSTRY

R. J. GILLAN, St. Thomas, Pa.

The short period when trees are dormant gives most fruit growers a little time out for planning and this year in particular it is very obvious that we should do some "Horse sense" thinking. Most growers agree that in no other year have conditions seemed as much disturbed. Along with our planning as an aid, we have our State Horticultural Meeting reports and contacts with those who attend, so that even though the information we get sometimes is not always pleasant, after a cooling off period we get optimistic for another year.

Iwould like to mention a few operations in particular which are necessary in good orchard practices, but which will not be done by wishing.

Trimming, we might say, is much like "Mark Twain and the weather"—much said but not much done; however, I would suggest cutting thin wood, correcting weak crotches by bracing either by wood or wire, and pruning to enable a good inside spraying job. This demands light pruning from outside and not cutting to cow-tail limb shape.

Spraying

When trees have been opened to do a good inside-out and outside-in spraying job, there are fewer culls or off-grade fruit as well as a saving of materials.

Whenever using combinations of liquid lime and sulfur plus lead, be sure to use a catalytic agent to safen the action and protect fruit and foliage, even in the lesser amounts of

sulfur we are now using. However, after pre-bloom sprays wettable sulfurs are excellent until extreme heat appears. Then one should go to copper excepting when the weather is damp. Then a wettable sulfur is better. It is also well to remember that regardless of materials it must be well done and on time whether it be with a broom or gun.

Cover Crops

In these times cover crops and particularly legumes for nitrogen will be much in order and perhaps some extra cultivation. We are having some results with the use of rye grass alone, rye grass plus vetch, rye plus ladino, red and crimson clovers. We are using some of these in an alternate row cultivation of bumpy young peach orchards. We like rye grass, after three years experience, a little better than rye either alone or in combination; it has a much better root system and does not demand such haste in turning under. For a permanent cover in apple orchards ladino and orchard grass is a good choice. Last but not least, be sure of your lime requirements, as the covers must have it.

Bruising

In a recent survey of bruising one can really be surprised as to how many places this occurs. However, I believe the most bruising occurs when pickers "dump" the apples in orchard crates. This bruising is something we cannot exercise too much care to eliminate, and extra paddings where bumps occur will help.

Packages, etc.

Consumer package demands are increasing. Boxes have not had their last word, especially in size and count, as to whether they are to be a bushel or 1⅛ bushel. However, in cold storage boxes seem to protect against bruising better than baskets, and well packed fruit even in these bad years could be sold at a profit. This would include advertising, such as our Appalachian Apples to make a season go over. However we have too many growers not yet ready to help pull the cost.

National Planning

A special meeting was held in Washington, D. C., August 11th to 13th inclusive at the request of Porter R. Taylor. Twenty-six major apple-producing states sent representatives. I represented Pennsylvania.

This committee, called National Apple Planning, also functioned in session as National Apple Institute with Paul R. Stark, chairman, and Truman Nold, secretary.

After much battling with economists, S.M.A. officials and trade members for higher prices during current season on S.M.A. purchases, it was agreed that they begin at outset of apple movement to get early varieties away, as these seemed to be very large. A price of ten cents per cwt. more than what actually was paid (Jonathan $1.05 per bushel for 2¼ and up, $1.00 per bushel for 2 in. and up) was agreed upon instead of 75c to 80c as in the 1940-41 period.

A second resolution was passed that the S.M.A. use no apples from growers who sold apples interrated below "utility" grade, and Pennsylvania went along on this.

It was announced that the combined amount of Lend Lease and S.M.A. would be about eleven million bushels, about equal in each operation.

The crop prospect was discussed by delegates and many differences were expressed in comparison with a year ago. The Pennsylvania prospect for 1941 was about 80% of the 1940 reported crop.

I would urge all Pennsylvania local fruit growers' societies to cooperate in supplying information as to the size and quality of succeeding crops in order to assist your representative at such meetings.

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PEACH BORER CONTROL TESTS*

H. N. WORTHLEY, Department of Zoology and Entomology, The Pennsylvania State College, State College, Pa.

At the meeting of this Association a year ago it was my pleasure to inform you that in spite of reports of damage to peach trees associated with the use of ethylene dichloride, no injury attributable to this material had appeared in our experiments. Today I am unable to repeat this statement, for out of 456 Elberta trees treated in the fall of 1940 with various materials under different climatic conditions, 118 showed injury to the bark when examined in July, 1941, and over 60 dead or dying trees were pulled in the fall of that year.

Some of the most badly injured trees were completely girdled, with bark and cambium at the crown of a brown color and spongy consistency, with streaks of this dead tissue extending into the still living tissue above and below the crown. Such trees could be recognized in the planting early in the spring of 1941 by their weak, yellowish foliage. This soon began to drop, and by late July the trees stood bare and dead, with half formed fruits studding the branches.

The materials used are listed in table 1. The mixtures were prepared as in former years, with materials from the same sources, except that the brand of fish oil soap was changed to conform to a plan for cooperative investigations by the Experiment Stations in neighboring states. Paradichlorobenzene was applied at the rate of 0.5 ounce per tree to trees in their fourth growing season. The crystals were applied to a ring of smoothed soil about the trunks, and covered with either 2 or 5 shovelsful of soil, which was then patted down to make a low mound. The emulsion was prepared by dissolving 3 pounds of PDB in 6 quarts of warm cottonseed oil and pouring this into a soap solution made of 3 fluid ounces of fish oil soap in 18 quarts of water. One pint of this emulsion contained one ounce of PBD, so it was used at the rate of 0.5 pint per tree. As with the other liquid treatments, it was kept thoroughly stirred, and was poured in measured quantity onto the soil about the base of the tree, at a distance of about 2 inches from the trunk. The soil was loosened and trenched slightly to prevent runoff. The commercial emulsion of paradichlorobenzene was **Parascalecide,** manufactured by the B. G. Pratt Company. Diluted 1 part to 7 parts of water it contained 0.5 ounce of PDB per pint. To prepare a 50 per cent emulsion of ethylene dichloride, 1 pint of fish oil soap was dissolved in 1 pint of water. Nine pints of ethylene dichloride, followed by 7 pints of water, was beaten in with a wire beater. The whole mixture was finally poured back and forth between buckets to produce a smooth, creamy emulsion. Two pints of this were diluted with 3 pints of water to make the 20% emulsion applied. Where soil was applied following an ethylene dichloride application it was merely sprinkled over the wet spot on the soil, not packed down.

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At the time of final examination in July of 1941, surviving borers were dug out, and the extent of girdling determined by cutting lightly into the bark at the ground level. A study of the figures in table 1 will show that the liquid treatments were more effective than the crystal application, and that ethylene dichloride gave the best control in November. However, in this set of experiments control is decidedly second in interest as compared to the injury associated with the treatments. Paradichlorobenzene crystals were used without injury, and **Parascalecide** with an insignificant amount. Of the other two treatments, the greatest injury to trees treated with PDB in cottonseed oil occurred in the September treatments, while with ethylene dichloride October treatments showed more injury than September ones, and November treatments the most. The results reported suggest that high soil moisture at the time of treatment may be conducive to injury, possibly by retarding the rate of diffusion of the gas and by allowing ethylene dichloride to remain against the bark in the liquid state. Other factors suggested include instability in the emulsions and the highly vegetative condition of peach trees in the northeastern states in the fall of 1940. Further experimental treatments were applied by Mr. H. M. Steiner in peach orchards in the neighborhood of Arendtsville in the fall of 1941, under experimental conditions that it is hoped will reveal the factors responsible for this type of injury to peach trees. Until the proper conditions for successful use of liquid treatments have been demonstrated, these should be employed with caution.

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● Breakdowns do not interfere with SPRAYING when you do it with a Hardie. The powerful Hardie pump gives FULL CAPACITY and HIGH PRESSURE at slow speed. Hardie COMPLETE LUBRICATION—even to the plunger cups—cuts down wear; saves power. Hardie exclusive, advanced features enable you to do more spraying per man per hour. Over 40 sizes and styles for orchard and row crops, delivering from 4 to 80 gallons per minute at 300 to 800 pounds pressure per square inch. Write for the big new Hardie Catalog. The Hardie Mfg. Company, Hudson, Mich.

HARDIE The ONLY Spray Pump that is COMPLETELY LUBRICATED
Dependable Sprayers

Table 1. Effectiveness and safety of treatments for Peach Borer Control. Variety, Elberta, in 4th growing season. Romig Orchard, Arendtsville, Pa., 1940.

Treatment No.	Treatment Data Date 1940	Soil Temp. 3″ deep. °F.	Soil Condition	Shovels Soil Cover	Results of Examination, July, 1941 Borer Control Trees Infest.	Total Borers	Injury to Trees No. Trees Affect.	Mean % Girdling
20 Per Cent Ethylene Dichloride Emulsion, 0.5 Pint Per Tree								
18	9/20	72-74	Dry	2	5	6	2	3
17	9/23	68-72	Moist	2	1	1	5	10
20	9/26	53-60	Wet	2	4	4	2	5
12	10/25	49-51	Moist	0	2	2	10	25
19	”	”	”	2	1	1	6	23
8	11/19	37-42	Very wet	0	0	0	18	50
9	”	”	” ”	2	0	0	23	72
Paradichlorobenzene in Cottonseed Oil, 1 Ounce per pt., 0.5 pt. per Tree								
15	9/26	53-60	Wet	2	1	1	17	48
16	”	”	”	5	1	1	20	56
11	10/25	49-51	Moist	2	0	0	3	10
14	”	”	”	5	1	1	6	7
Paradichlorobenzene Emulsion, 1-7, 1 Pint Per Tree								
10	9/26	53-60	Wet	2	0	0	2	2
5	”	”	”	5	1	1	2	2
6	10/25	49-51	Moist	2	3	3	1	1
7	”	”	”	5	0	0	1	1
Paradichlorobenzene Crystals, 0.5 Ounce Per Tree								
4	9/26	53-60	Wet	2	3	4	0	0
1	”	”	”	5	2	2	0	0
2	10/25	49-51	Moist	2	7	7	0	0
3	”	”	”	5	4	6	0	0
13	No Treatment				23	73	0	0

FUNDAMENTALS OF ORCHARD SOILS

NELSON J. SHAULIS, Department of Horticulture, Pennsylvania State College.

When we speak of orchard soils we think of soils suitable for fruit production. Such soils are different in two respects from the soils adapted only for general farming. Because an orchard soil is subjected to a season-long demand for water and nutrients during twenty or more years, it must be deep, well drained, and fertile. That is the description of an orchard soil which is a common one. Secondly, the orchard soil, particularly peach, cannot be retired to sod every three or four years as can the general farm soil. Any cover crop or sod must be grown **with** the trees. Thus, orchard soils must be selected for a large quantity of good rooting medium and they must be managed so that the effects of the management will be increasingly beneficial on succeeding crops of fruit.

Let us first consider the matter of orchard soil selection. The pomologists at Cornell University have made detailed studies with orchard soils in which the emphasis has been on the identification of soil characteristics which effect fruit tree productivity. Because our Pennsylvania fruit soils are more mature and, in general, the internal drainage is better developed, the problems of water logging are not as serious on soils as the Hagerstown, Berks, Ashe-Porters, and Chester-Manor. On the Dunkirk, Penn-Lansdale, and Dekalb it is more likely that poor drainage and compact subsoil may be encountered.

I believe that depth of soil, that is quantity of good rooting medium, is the most important soils consideration to confront us. Too many apple and peach trees are on soil only deep enough for wheat.

If we assume four million pounds of soil to the acre foot, then one inch of water is equivalent to an increase of about 6% by weight in the amount of available water in this top foot of soil. Some of the loam soils used in fruit growing in southern Pennsylvania contain 10 to 14% available water at their field capacity. Thus, two inches of rainfall could increase the available water from nothing up to its maximum. From May through September of last year we had an eight-inch deficiency in rainfall. Most of the orchards receiving a similar rainfall produced inferior fruit because of this deficiency. We should remember those drought periods and our futile wishes for a soil moisture reservoir which was two feet deeper when we "go ahead and plant" on shallow soil. Such a practice is a gamble in an industry where there are enough gambles which cannot be controlled. Many of our so-called droughty soils are such because they are low in quantity of soil rather than in the quality of water-holding capacity as may be found in sandy soils.

To those of you who do not plan to use new sites, any discussion of the adaptability of soils to apple and peach growth can enable you to estimate whether your soil is a bottleneck in your orchard operations. In my own orchard I've eliminated about six of the forty acres because in those six acres, poor drainage and shallowness of soil make the best fertilization, pruning, and soil management unprofitable. On the other hand, there is a fifteen acre plot which has excellent soil—deep, well-drained, thoroughly root-permeated. On this area, soils are not limiting—and more detailed attention in other orchard operations has been profitable. The important thing actually is to know what parts of the orchard are unprofitable or potentially unprofitable because of inferior soil. To know this is to operate more efficiently.

By what criteria can we identify these areas? We generally walk over a tract of land before we buy it—perhaps to note how well general crops grew on it. Would any of you choose a home by noting only the appearance of the roof as viewed from a tower or a low-flying airplane? You would be likely to find a well-kept slate roof on a new fire-proof building and a patched paper roof on a flimsy building, but such indications are no more adequate than to walk over a soil to determine its value for fruit production. One should look in the cellar or subsoil for standing water; look at the air conditioning system or the pores to see if there is danger of suffocation; look for roots to see if it can be inhabited; look in all the soil layers for evidence of a good nutrient supply (perhaps actively decomposing organic matter); count the number of stories or depth of soil to see how many roots can be housed and fed under the one roof; look at the cellar drain and bedrock for an outlet for excess water; look at the size of the hallways and pores to see that roots may move readily within the soil. Frequent observation of good and of inferior soils will make the identification of borderline cases more certain.

Lest this analogy be accepted as complete, every square inch of the roof or the surface of the soil should leak. Any tendency of the surface to form an impermeable crust is undesirable because it would impede water absorption.

It would be very desirable to know the texture, structure, acidity, aeration, and available nutrient content of each horizon of your orchard soil. It would be difficult to obtain these analyses for every orchard in which you may desire such information. But we can select and study our orchard soils more intelligently if we would use an inspection procedure such as the following:

1. Dig holes about one foot in diameter and at least thirty inches deep. Dependent on the severity of holes of the slope, erosion, or known variability, one to four holes per acre might be sufficient. Early spring would be a preferred time for such a study.
2. At the time of digging, note the depth of top soil, the compactness of the subsoil, and evidences of root penetration into the subsoil. Note the depth to bedrock. The presence of gray, or orange mottling of the soil is an indication of poor aeration.
3. Over the period of a month or more, note the height to which water accumulates in these holes. It is desirable that water drain rapidly from the subsoil. Your extension representatives could assist you in the interpretation of your observations.

When this is completed, the observer will have first hand information on the amount of soil and some good indications of its suitability for fruit growth.

In Figure 1 we have shown the rooting of a mature Elberta peach tree on Penn shale loam. Here the soil depth is greater than the depth of root penetration which is slight below the second foot because there the soil is compact and poorly aerated. These two characteristics make this soil an inferior one for fruit growing.

In Figure 2 there is shown the root distribution of a mature South Haven tree on Ashe-Porters loam. The major difference between this and Figure 1 is the great increase in the quantity of soil, that is the size of the reservoir for moisture and nutrients. This soil has a less compact subsoil, better internal drainage; it provides much good rooting medium. I believe you will find it very interesting and certainly profitable to dig a similar trench in your orchard.

The study of the rooting photographs presented by Dr. Rogers of England further emphasizes the importance of the physical condition of the soil as it affects fruit tree roots. His photographs indicate a rapid extension of roots through the soil, their becoming inactive and new root extending near them—all within several weeks. When it is recalled that moisture and nutrient absorption depend in part on the area of contact between young, white, fragile roots and the soil we cannot fail to be impressed with the importance of providing and maintaining a large amount of good rooting medium.

To this point we have not mentioned the chemical or the nutrient content of the soil as a factor influencing its selection as an orchard soil. The physical characteristics just dis-

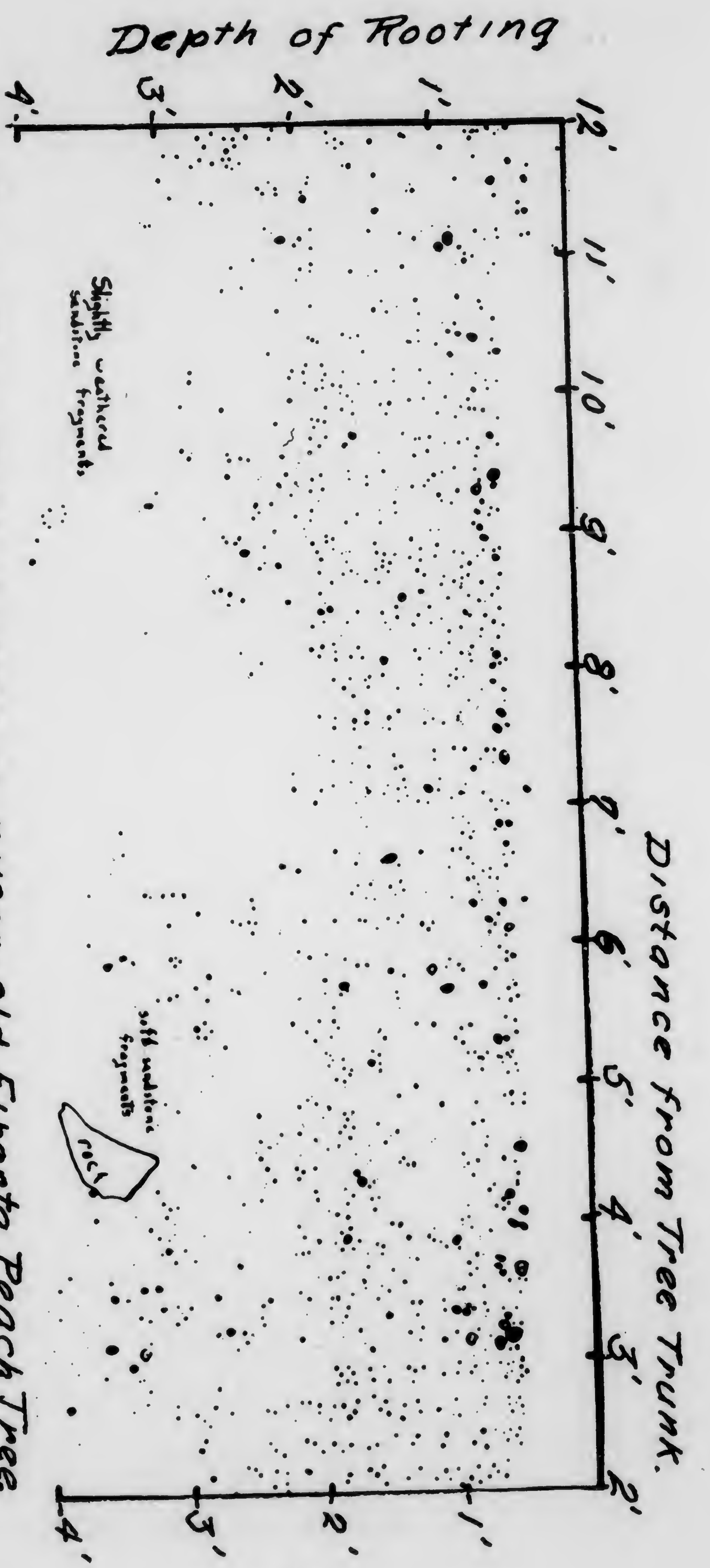


Fig. 1. Root Distribution of 5-year-old Elberta Peach Tree
Penn Silt Loam Raffensperger Tree H15 1940.

cussed must be considered first. In any list of characteristics which must be present in a good orchard soil it is not wise to put the first emphasis on those physical properties which cannot be obtained by any management practice, but which are inherent in the soil. I refer particularly to a light texture, adequate drainage, absence of compaction, and depth of soil. If there is a nutrient deficiency, lime or fertilizer or mulch could probably correct it. This is especially true on the moderate textured soils, on which most Pennsylvania fruit is grown, where mineral deficiencies are much less common than in the sands of the Costal Plain. Last month I visited some citrus groves in Florida where, in addition to drainage, irrigation, nitrogen, phosphorus, potassium and calcium problems, there were the added ones of copper, zinc, manganese and magnesium. The growers must be very soil-conscious under such conditions.

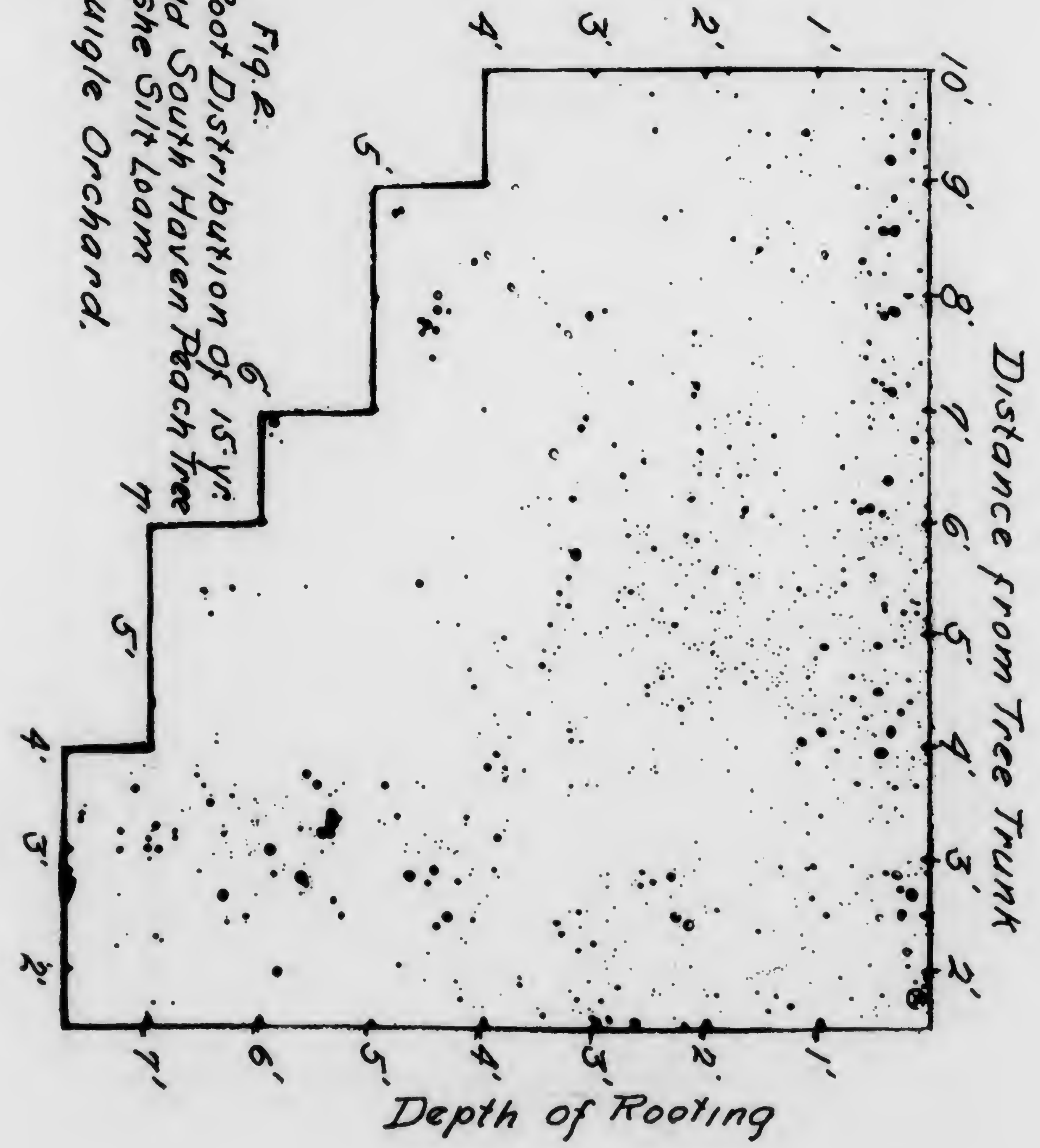


Fig. 2.
Root Distribution of 15 yr.
Old South Haven Peach tree
Ashe Silt Loam
Quigle Orchard.

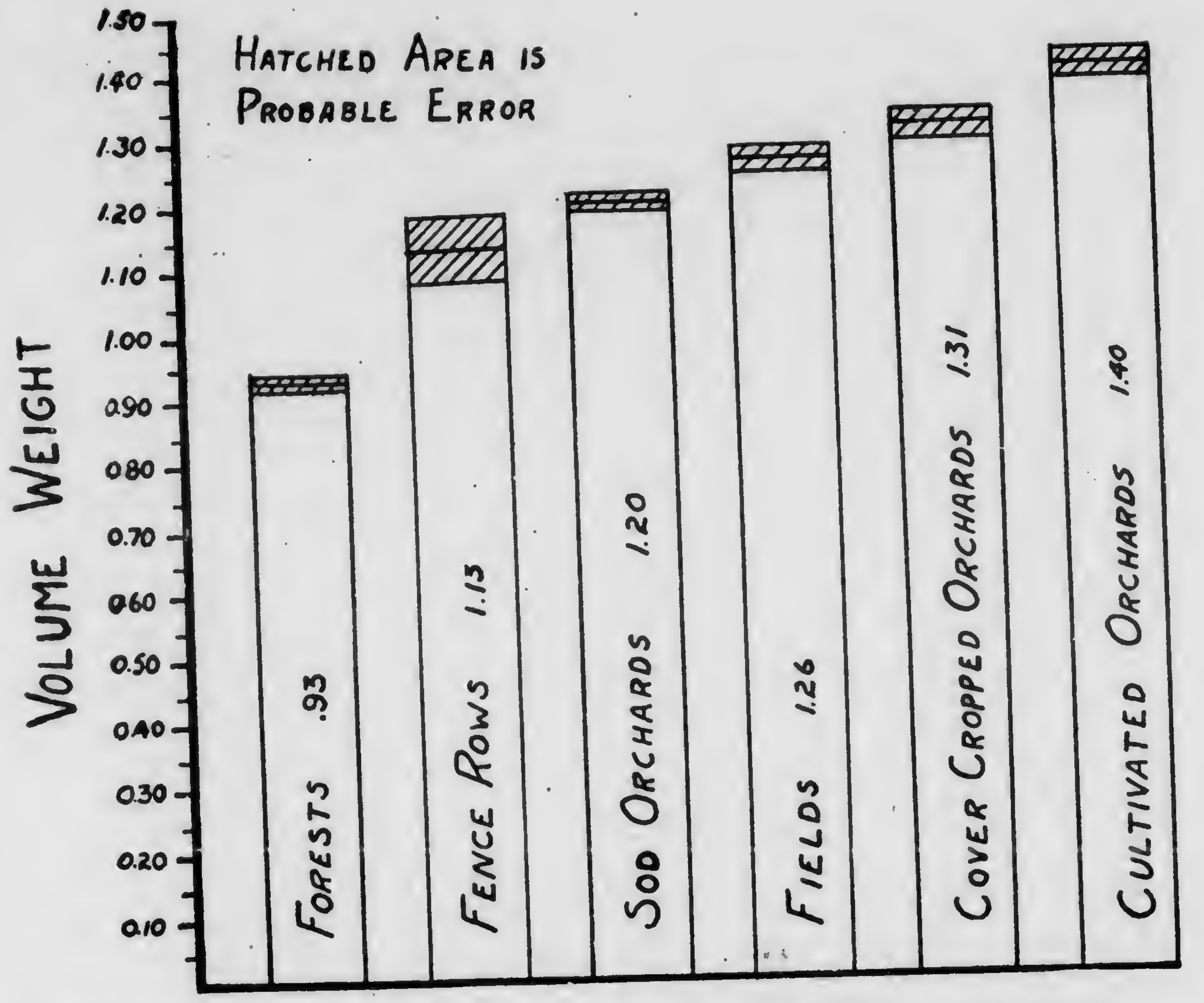


Fig. 4.—Volume weight of soils as influenced by management.

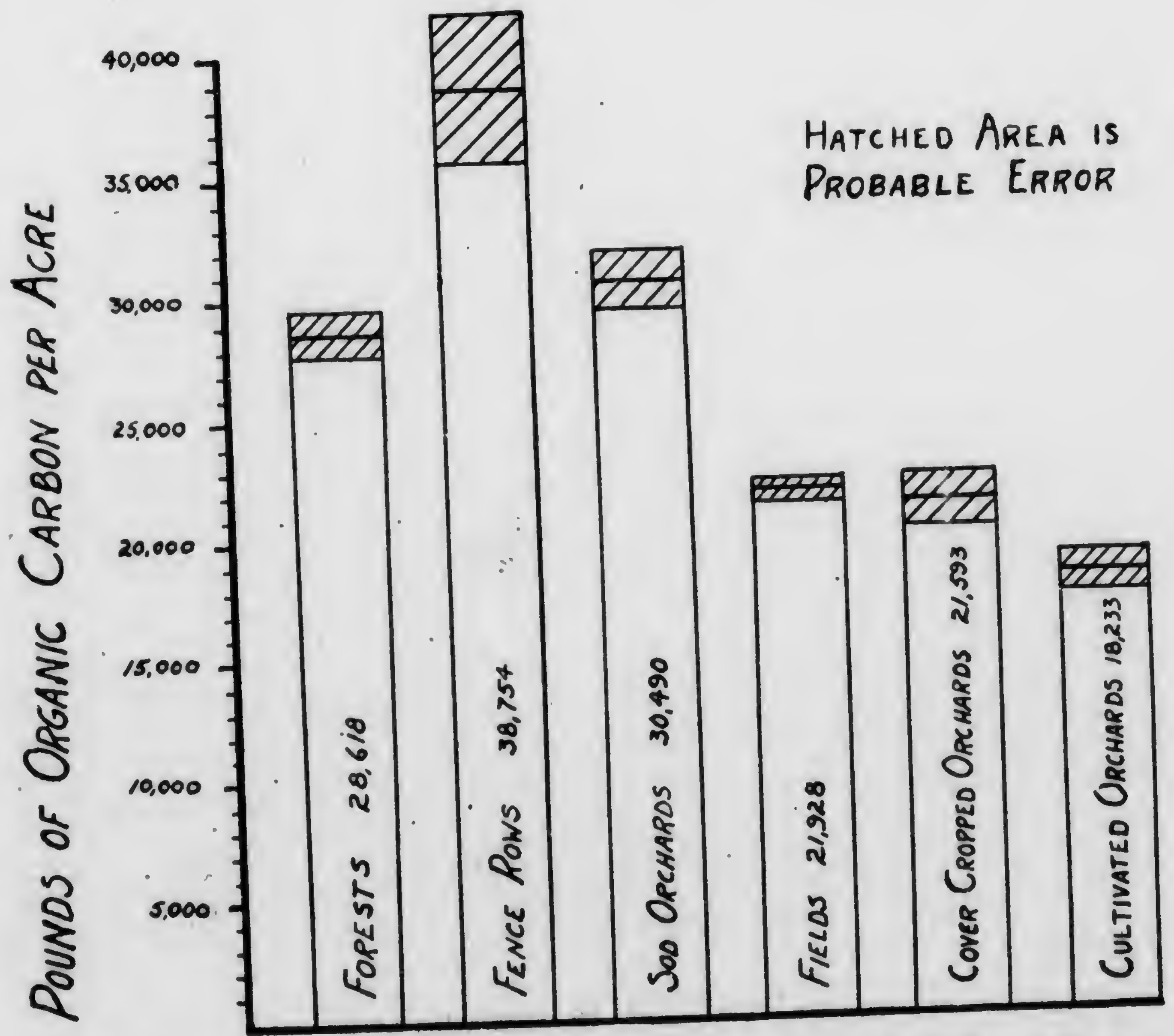


Fig. 3.—Organic carbon content of soils as influenced by management.

In our introduction we spoke of the two soils problems of major importance to fruit men. That one of getting a good soil and of knowing the soil you have has been discussed. How shall we maintain the good soil we have chosen? That is one of the most controversial problems in orchard management because it involves the decision concerning the amount of competition in the form of sods or cover crops to which it is practicable to subject the fruit tree. Unquestionably, an undisturbed sod will be most effective in maintaining or even improving a soil; it will be just as effective in competing for water and nutrients. With respect to the soil, clean-cultivation is the most destructive management system but in most instances tree growth is superior to that in other management systems because there is no plant competition.

Our data from the peach orchard management plots at Arendtsville indicate that reductions in available moisture and available nitrogen will explain most if not all the reduced growth in our sod and cover crop plots. If I should make a recommendation of a cultural system—of a definite time to seed and to disc a particular cover crop—I should certainly be going afield from fundamentals. However, we can take stock of the soil and estimate whether there is sufficient depth of soil to store water for both tree and cover crop or sod, and whether the topsoil is sufficiently rich in organic matter to release nitrogen for both the tree and the cover crop or sod.

There are many sites which have been subject to an annual loss of some of the top soil, and where the depth to bedrock is not more than two to three feet. Here, the use of a sod rotation or heavy cover crops through most of the summer could result in a decrease in tree and fruit growth in years of low moisture. There is just not enough room for both peaches and a really sound soil management system in such an orchard. The intensive cultivation necessary for peach growth in this case would probably lead to early abandonment of the site. Contour cultivation with some mulching might be necessary for soil maintenance and tree growth.

Most of you have or know of a site where the good soil is four, six or more feet deep. Here the growth of the tree is much less affected by the cover crop withdrawal of moisture and nutrients from the top eighteen inches of soil than in the two foot soil. The emphasis I wish to make is to have you know your soil sufficiently well that you can decide where heavy cover crops, sods, or mulches can be used to best advantage.

In the case of the peach it is necessary that soil conditions favor terminal growth over a longer period of time

than the apple. This means that we must make a special effort to provide adequate moisture and nutrients to the peach tree from bloom until harvest.

In another instance the grower can use his knowledge of the tree-soil cover crop relationship. This is in knowing the extent of tree rooting when a decision is made on the width of a cultivated strip for young trees. It is just as important as timing an early spray by knowing when the petals or shucks fall.

To repeat a clause in the introduction—the soil must be managed so that the effects of the management will be increasingly beneficial on succeeding crops of fruit. The two graphs which are presented here are taken from Pennsylvania Bulletin 373. In this study we were interested in a study of the effects of orchard cultural practices on the soil. In fourteen orchards where comparisons of the top soil were made, the cultivated orchards had about 10,700 pounds less organic carbon than the sod orchards. As the length of cultivation or the frequency of it increased the soil was depleted of organic matter and nitrogen.

The second chart Figure 4 indicates that cultivation tends to increase the compaction of the soil. Thus, a cubic foot of the cultivated soil weighed 87 pounds, the cover cropped soil weighed 82 pounds and the sodded soil weighed 75 pounds per cubic foot. These weight increases are due to increased compaction, dispersion of the soil, and to the exposure of the more dense subsoils.

In summary: (1) the greater the volume of soil in which the tree can root well, the less is the danger of soil moisture and nutrients being inadequate; (2) the proven advantages to the soil of heavy cover crops and sods make their adoption in the orchard desirable; (3) the choice of soil management systems depends partly on the species, even variety, of fruit and on the capacity of the soil to grow good cover crops or sods as well as fruit trees; (4) the increased study of the orchard soil by the grower would tend to make his choice of management practices, perhaps even the extent of planting, a more logical one.

REPORT OF GYPSY MOTH IN PENNSYLVANIA IN 1941

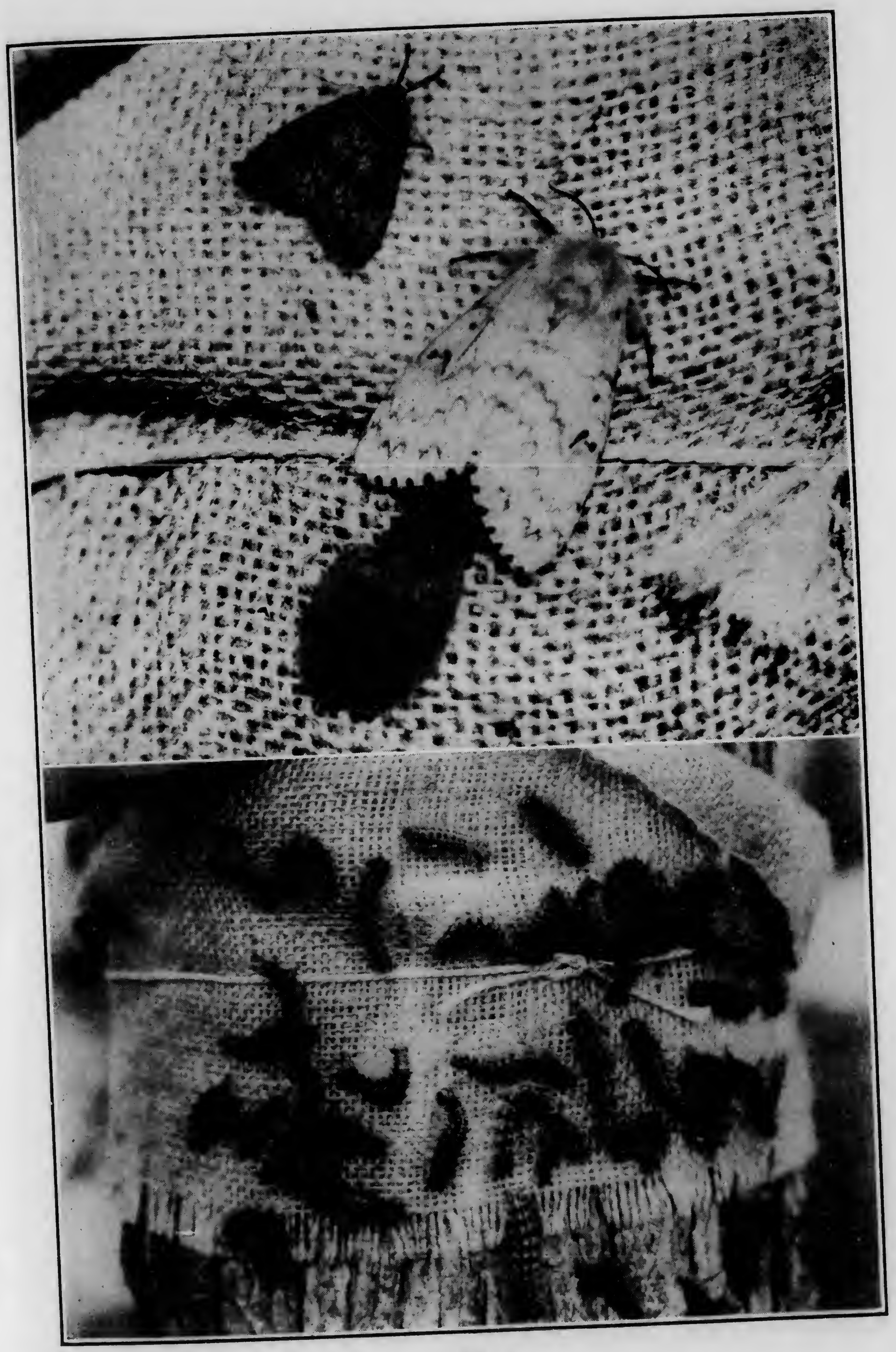
By DR. T. L. GUYTON, Pennsylvania State Department of Agriculture

Last year we told you something about the distribution of the Gypsy Moth in Pennsylvania. We told you that the moth was discovered in this state in 1932 in the Wilkes-Barre-Scranton district, and that since that time, efforts have been put forth by the Pennsylvania Department of Agriculture and the Federal Department of Agriculture to exterminate the pest. We reported that progress had been made and that the infestation was greatly reduced. We can report continued success for this year. However, there is a condition existing not a great distance from Pennsylvania along the New York-New England line which is somewhat alarming. There, infestations seem to be building up and if not reduced are fairly certain to result in the reinfestation of Pennsylvania; and probably in the end infest all the states to the west where the food plants of the moth may be found. This means that in all areas where the oaks are the dominant forest covering and where there is an important fruit growing industry, the moth will become established and cause a very considerable loss. In the past season in the neighborhood of 70,000 acres located in the New England States were defoliated. This will give you some notion how extensive this loss may be from Gypsy Moth. Three or four successive defoliations of deciduous trees, such as oaks and apple will result in the death of these trees. In the case of evergreens, a single complete defoliation is fatal.

About 1923 an area was established east of a line extending from Long Island Sound up the boundary between New York and New England States to the Canadian border which was to be known as a barrier zone. This barrier zone was to be an area through which the moths might not pass, thus to serve as a protection from the moth to all states to the west. This barrier remained effective until the time of the New England cyclone. At which time it seems that some of the forms of the moth were carried in large numbers into this zone, and since that time the barrier zone has become increasingly populated. In the past year, several infestations have been found in the eastern part of New York. All of these seem to have been the result of the establishment of the heavy population in the barrier zone.

It now becomes a national problem to dispose of the heavy infestations in this zone. Unless this is done soon, we are of the opinion that it will not be worth doing it, since a few more years of this heavy population undoubtedly will make certain the establishment of the insect permanent in many parts of New York, Pennsylvania and New Jersey.

The eradication procedure in any location consists largely of: scouting to definitely locate the infestations;



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INTENTIONAL SECOND EXPOSURE

treating of egg masses to prevent their hatching; cleaning up and burning of forest and other debris to destroy eggs and to make easier the spraying and banding of trees which come later; banding of trees with burlap under which the caterpillars are trapped and killed; and the spraying of trees located in the infested areas whether they be in town, scattering tree growth, or in woodland. The poison used in spraying is lead arsenate, with fish oil added as a spreader and sticker. Approximately one hundred tons of lead arsenate and six thousand gallons of fish oil have been used annually in the spraying of the infested trees in Pennsylvania.

To prevent the movement of the egg masses out of the area on such materials as stones, logs, firewood, junk and the like, a quarantine is placed, restricting the movement of such materials until after they have been inspected and certified by competent inspectors. This certification also applies to the movement of materials within the known area of infestation.

This is not Pennsylvania's first experience with the Gypsy Moth. By 1920 a colony was located at Loretta, in Cambria County. Through the prompt action of the State Department of Agriculture and cooperating property owners, the colony was completely eradicated within a few years. A rather large infestation was found in New Jersey shortly before 1920. This colony has also been eradicated.

It is interesting to note how much it costs to live with an infestation of Gypsy Moth. Massachusetts officially spends about $800,000 per year for such control measures as they were able to provide along roadways, towns and parks. In spite of the spending of this sum there are many places in that State where there is at least 50% defoiliation of forest trees. It is estimated that that State has spent over $26,000,000 to date on control of this insect. Other New England States spend like large sums each year for only partial control. It is because of the high cost involved in partial control and the evidence of the great damage this species will cause to our forests and orchards that we are so much concerned in keeping down any threat of general establishment in this State.

Explanation of Plate

The parent moths are shown in the upper part. The smaller one is the dark colored male. This moth is able to fly considerable distances. The large light colored moth is the female. She has wings, is not able to fly more than a few feet. Directly below the female moth is her egg mass which is light in color and may be as large as the end of the thumb.

The lower part of the plate shows the young caterpillars of the Gypsy Moth. They have collected under this burlap band for shelter. Advantage is taken of this habit in controlling this insect. Trapped caterpillars are destroyed by crushing.

—Photographs loaned by U. S. D. A. Gypsy Moth Office, Greenfield, Massachusetts.

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DORMANT SPRAYS ON PEACH*

**H. M. STEINER, Department of Zoology and Entomology,
Pennsylvania State College, State College, Pa.**

We use dormant sprays on peach in Pennsylvania for such pests as San Jose scale, terrapin scale, European red mite and peach leaf curl. Many of you attack these pests with two sprays consisting first of lime sulfur or Bordeaux mixture in the late fall and secondly, of oil in the spring. Others combine their spray materials into one all-purpose mixture in the late winter or early spring. Of course some apply no sprays at all. There are faults and virtues in each of these programs.

In planning our research program around pests for which control measures are unsatisfactory, we must not upset the good treatments for other pests. We have to use the insects that are available to us now in order that later outbreaks may be treated more efficiently or suppressed before serious losses occur. Terrapin scale and the European red mite have been taking an increasing toll in some of our orchards. We are using these pests freely in our tests. San Jose scale has been so scarce in commercial orchards near the laboratory that we could not include it in our counts although it has increased in numbers during 1941. We might soon have heavy infestations to worry about once more if the spray schedule is not planned to include it.

Oil sprays continue to offer the most promise for control of these pests in the dormant period. Some of you have suffered oil spray injury and a resultant light crop of fruit. For this reason, we have been especially concerned with safe oil concentrations, the behaviour of different emulsifiers, and their compatibility with various toxicants and fungicides.

Choice of Oils

There are several good oil mixtures on the market together with some that should have limited use. Since these oils differ mostly in the emulsifier and slightly in the oil base, their exact constituents are usually trade secrets. For our work on peach we have been using home-made tank-mixtures and stock emulsions employing the raw oil with various emulsifiers. Where additional materials must be added to the raw oil, we can select a suitable emulsifying agent that is compatible with the mixture.

The oil used in the tests reported here was a paraffin-base type of oil of 105 seconds viscosity (Saybolt at 100° F) of 65 to 70 per cent unsulphonatable residue and of 27° gravity. It was available in 1941 at 8 cents per gallon in tank car lots. It was tank-mixed by adding the emulsifier to 5 gallons of water in the tank, pouring the required oil into the tank thru the spray stream, pumping the mixture over for one minute and diluting with water while continuing to pump the mixture thru the gun. Such mixtures were sprayed out without stopping the agitator.

Safe Dosages for Tank-mixed Oils

Since oil sprays are capable of producing injury, we must take advantage of the known ways of avoiding it. One of these would employ the minimum effective dosage that may be used safely on healthy trees. Since these studies were begun in 1939, we have used oils of 3, 4, 4½, 5 and 6 percent concentration to determine the safest effective concentration where Goulac is used as the emulsifier. The tests reported in table 1 were made on Elberta trees in the orchards of Roy Heckenluber and Harvey Oyler near Arendtsville. Increasing the oil content above 4 per cent gave little improvement in control and increased the degree of oil injury to the buds.

The sprays of 1940 were applied at temperatures of 40 - 50° F. and those of 1941 at 50 - 60° F. As in most of our dormant spray work on apples, the kill of insects by oils increases and injury to buds decreases with an increase in temperature at the time of spraying. It is not likely to get too warm for safe oil applications in the dormant period.

Table 1. Oil Concentration for Terrapin Scale.

Gals. of oil tank-mixed with 8 oz. of Goulac per 100 gals. of spray	Percent control of terrapin scale:		Percent of buds killed by spray:	
	1940:	1941:	1940:	1941:
3	88	88	8	4
4	95	98	9	3
6	97	100	37	11

Qualifications of Emulsifiers

A satisfactory emulsifier for use with oils on peach should produce a more stable mixture than is needed for apples. It should lay down an even coating of oil on all sides of the twigs. The oil deposit should not build up when the gun or spray rod is held too long in one place as such mixtures would cause spotty injury from over-spraying. It should be compatible with waters of varying hardness and with spray mixtures added to oil. Dr. P. J. Chapman and his associated of Geneva and Poughkeepsie, New York, have recently emphasized that oil deposits produced by sprays of the same oil concentration may vary with the kinds and quantities of the emulsifiers used. Other factors that may influence the degree of oil deposit are the temperature, wind velocity, and rate of drying at the time of application, or double-dosing a portion of the tree by spraying a half row and allowing some time for drying before returning on the opposite side to finish the spray operation.

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*Authorized for publication, February 20, 1942, as Paper No. 1086 in the Journal Series of the Pennsylvania Agricultural Experiment Station.

The results obtained with different emulsifiers used with 4 percent oil in 1941 are shown in table 2. Due to the favorable weather conditions prevailing during and following these applications, only slight injury occurred with most materials.

Goulac: A commercial brand of lignin pitch was available in 1941 at less than 5 cents per pound. It was used at the rate of 8 ounces per 100 gallons of spray. The amount used can be varied slightly without materially affecting the value of the spray. Although it is known to deposit less oil than certain other materials, it is more nearly fool-proof than most emulsifiers available to the grower. It behaves in much the same way with waters of varying hardness commonly used for spray purposes. The oil coating obtained with this material appeared to be more uniformly distributed around the twigs than that obtained from other emulsifiers. The diluted spray from such a mixture is more stable, when forced from a spray gun, than that produced by other emulsifiers tested here. Lignin pitch is the safest of the emulsifiers tested for use with lime sulfur-oil mixtures.

A Goulac stock emulsion of oil forms a more stable mixture in the tank than does a tank-mixture. Stock emulsions containing 67 percent oils have been made with Goulac that will hold for several weeks and probably form the least expensive sprays that we can use on peach in the dormant season.

Blood albumen: This was available in 1941 at 15 cents per pound. For use in tank-mixing oils, 2 ounces are mixed with 6 ounces of diatomaceous earth or Fullers earth. Previously prepared mixtures can be purchased. As used in these tests, it gave an oily coating that persisted for several weeks. While we had little injury with the material used alone with 4 per cent oil on peach in 1941, it has given serious injury in the hands of fruit growers under different weather conditions. Smaller amounts of blood albumen give less stable mixtures and higher amounts may greatly reduce the amount of oil deposited on the tree. We need to test this material with lower oil concentrations before we can tell you much about its value on peach.

Bordeaux Mixture: We have had good results with this material used as an emulsifier for oil on peach and apple. Increasing the concentration of Bordeaux mixture above 2-4-100 decreases the control obtained with terrapin scale where 4% oil is used. It appears to lay down more oil on the under surface than on the upper surface of twigs and for this reason may be more effective against red mite eggs than Goulac emulsions. Where used in tank-mixtures with oil, it tends to form layers unless good agitation is maintained in the tank. However, most of your sprayers can be adjusted to give suitable agitation for the use of this mixture.

Other emulsifiers: Two types of emulsifiers sometimes used in making miscible oils were tested in 1941. They were a polyglyceride and a petroleum sulfonate. Each gave satisfactory results when used alone in tank-mixtures of 4% oil. Neither was compatible with oil-lime sulfur mixtures, both causing the emulsions to break in the tank when lime sulfur was added to the oil. Such mixtures could not deposit a uniform oil coverage and would cause severe injury on the last few trees sprayed from a tank. Some of the commercial brands of oil prepared with such emulsifiers behave similarly where liquid lime sulfur is added to the oil spray.

Experimental Mixtures of Oils and Added Toxicants

Elgetol, currently advertised for use with oil against terrapin scale and European red mite has given us severe bud injury when used at the rate of 1 or 2 quarts with 3 gallons of oil per 100 gallons of spray. The control obtained with these mixtures was inferior to that obtained with 4% oil. We had previously obtained severe injury with Elgetol at 1 and 2% concentration and with DN oils used on peach in 1939.

A lethane-oil mixture at 3% concentration was slightly superior to 3% oil-Goulac and gave no increase in injury to the buds.

Liquid lime sulfur added to oil is of questionable value for terrapin scale and European red mite in dormant peach sprays. Lime sulfur-oil mixtures have been repeatedly tested in our work because of their possible place in a combination disease-insect spray program. A single application of lime sulfur-oil tank mixed with Goulac is safer than spring applications of lime sulfur and oil applied separately. Where the materials are applied separately, several weeks should elapse between sprays.

Timing and Application of Sprays

The timing of oil spray applications to peach is best determined by weather conditions prevailing in late winter and early spring. Dormant sprays applied under Pennsylvania conditions are effective in late March and early April when applied near the time when the bud scales crack or loosen. Late winter spraying lessens the danger of extreme cold weather following the spray applications. The warmest hours of the day are safest with temperatures above 45° to be preferred at the time of spraying. Trees in a weakened condition due to drought, winter injury or severe insect damage are more readily injured by heavy oil sprays than are

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fur and mannitan monolaurate combinations appears to be due to the heavy load of sulfur deposited on the tender foliage. The results need verification by later work before we can leave this phase of the study.

Good results have been obtained in our tests with cube' powder against the pistol case-bearer when applied in pink and petal-fall sprays. However, the accumulation of injury by the larvae and the prevalence of moulting larvae not susceptible to attack at this season has emphasized the desirability of controlling this pest earlier at the delayed dormant period. Where a second spray is required because of heavy case-bearer populations it can be included in the pink or the petal-fall spray.

Table 1. Pink and petal-fall sprays against European red mite.*
Romig orchard, 1941.

Materials & rates per 100 gals of spray:	Number per 100 leaves: Live mites: 5/3 - 5/5	Mite eggs: 5/16 - 5/19	Spray injury
Liquid lime sulfur 2.5 gals. Lead arsenate 3℔.	91	821	Severe leaf injury
Liquid lime sulfur 1.3 gals. Lead arsenate 3℔. water-pasted with powdered skim milk 8 oz. and maganese sulfate 4 oz.	102	950	No injury
As above plus mannitan monolaurate 1 pt.	21	124	Slight leaf injury
Liquid lime sulfur 1.3 gals. Cube' powder 1℔. Mannitan monolaurate 1 pt.	7	24	Severe leaf injury
Wettable sulfur 6℔. Cube' powder 1℔. Mannitan monolaurate 1 pt.	3	9	No injury
As above plus lead arsenate 3℔.	3	18	No injury
Wettable sulfur 6℔. Cube' powder 3℔.	81	866	No injury
Wettable sulfur 6℔. Dicyclohexylamine salt of DNOCHP 8 oz. water-pasted with powdered skim milk 8 oz. and lead arsenate 3℔.	20	90	No injury
Unsprayed checks	158	1281	

*—8 replicates per treatment on 4 year old York Imperial trees.

STUDIES OF CODLING MOTH COVER SPRAYS IN 1941*

HARLAN N. WORTHLEY, Department of Zoology and Entomology, The Pennsylvania State College.

The experiments reported here were conducted in a block of mature apple trees in the orchard of H. G. Baugher at Aspers in Adams County. Each of eight different spray mixtures to control larvae of the first brood was applied to five randomized single tree replicates of Stayman Winesap and four of Rome Beauty. The area involved was nearly square, and was partly protected from the influx of summer brood moths by a three-row border that received uniform and thorough first brood treatment. The trees in this border also were used for the testing of twelve different spray mixtures for the control of second brood larvae. As in former years, all spraying was done by the staff in entomology at the Fruit Research Laboratory at Arendtsville, using a single nozzle gun from the ground only, at about 550 pounds pressure.

Factors Concerned in the Timing of Cover Sprays

Records of moth emergence and flight were taken in the experimental block, and were used to help in the timing of spray applications. In addition, frequent examinations were made of the fruits on four unsprayed trees located near the corners of the block, and the number of codling moth injuries recorded. These records, together with the dates of spray applications, are shown in figure 1, which represents several points worthy of comment.

First, the period of heaviest flight of spring brood moths, began about ten days after the beginning of moth flight, although the emergence cage records showed that at this time only 25% of the moths had emerged. The first "stung" apple was observed during this peak flight, two weeks after the first moth emergence.

Second, for about a month after the first codling moth attack the number of worm injuries increased gradually. Then, during late June and early July there was a rapid rise in the number of injuries. In contrast to this **delayed** injury by larvae of the first brood, a steady and rapid increase in the number of second brood injuries occurred **during** the period of heaviest summer brood moth flight, from late July until mid-August. The explanation is probably to be found in weather conditions. In particular, night temperatures during the flight period of summer brood moths are usually more conducive to rapid and successful codling moth development than in late May and early June, when spring brood moths

are on the wing. Although summer brood moths were much fewer in number than those of the spring brood (due largely to the effectiveness of the first brood cover sprays) they must have produced more larvae, for the second brood caused more than half the damage to the crop.

Third, the cover spray schedule, based on peaks of moth flight, subsequent weather conditions, and worm entries was timed to maintain effective spray coverage throughout the period of attack, and to renew this coverage at critical times.

First Brood Sprays Effective Throughout Season

In the block devoted to first brood spray comparisons all trees were scraped and banded with untreated bands. The full-grown codling moth larvae that sought shelter in these bands were removed at 3-day intervals throughout the season. Figure 2 shows a comparison of the cumulative collections of larvae per tree from the 40 sprayed trees and from the 4 unsprayed trees. It makes plain the fact that the first brood spray treatments, all but one of which ended with a third cover spray on June 17 or 18, remained almost perfectly effective until about August 10. Worms entering the fruit at this time were full grown and ready to spin cocoons by August 31, at which date less than 4 worms per tree had been taken from the sprayed trees as against 180 per tree from those that received no cover sprays. These short schedules of deposit building spray mixtures continued to provide a high degree of protection during the period of second brood attack, for from September 1 until the last collection of larvae on October 24, after harvest, only 41 larvae were taken per sprayed tree as against 235 larvae per unsprayed tree. The record suggests about 80 per cent control of second brood larvae by the residues remaining from the first brood sprays. It must be remembered, however, that the trees in question were partly protected from reinfestation by the barrier zone that received both first and second brood treatments. In addition, as shown in figure 1, moth activity was of little consequence after mid-August, due to unfavorable weather conditions. For this reason the attack of second brood larvae in late August and September was much lighter than in some seasons, as shown by the flattening of the "injury" line in figure 1.

Relative Effectiveness of First Brood Spray Mixtures

Among the seven spray treatments that employed lead arsenate with various stickers and deposit builders the final records, including both picked fruit and drops, showed percentages of clean fruit ranging from 73 to 76 per cent on the Stayman Winesap and from 74 to 78 per cent on the Rome Beauty. In number of worms per hundred apples at harvest the treatments varied from 7 to 12 on Stayman, and from 11

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to 16 on Rome. These differences are not marked, but had the treatments been applied to trees in large blocks, it is probable that the worst treatment would have been still worse, and the best treatment still better, than is indicated by the figures in table 1. For example, in the counts of first brood damage made on July 9 the number of worm entries in treatment 1 was about twice as great as in the worst of the "dynamite" treatments, and 13 to 14 times as great as in the best ones. Had all trees in the block produced as many first brood worms as those that received treatment 1, the number of summer brood moths and of second brood worms would have been larger, so that by harvest time the total worminess in treatment 1 would have been considerably greater than is indicated in table 1. Conversely, had all trees in the block been as well protected as those in treatment 5 during the first brood attack, worminess in this treatment would have been lower than the figures given in table 1 at harvest time.

Table 1. Nature and effectiveness of first brood codling moth treatments to Stayman Winesap (S) and Rome Beauty (R) Baugher Orchard, Aspers, Pa., 1941.

Treatment No.	Schedule and Materials Amounts per 100 gals. of diluted spray mixture	Total Apples per Tree	Per cent Uninjured Fruit	Worms per 100 Apples July 9	Worms per 100 Apples Harvest	Per cent Injured Leaves—Sept.	Lead Residue Grains per ℔.
1	6/3 L. arsen. 3℔s., hyd. lime 3℔s., Sk. milk powd. 0.5 ℔.	S 4539	73	1.3	12	34	.060
	6/18 L. arsen. 3℔s., Bordeaux 1-3-100	R 3148	74	1.4	16	6	.028
2	5/29 L. arsen. 6 ℔s., Fish oil 1 pt., No. 2 Fuel oil 2 qts., 20% Am. oleate 1.5 pts.	S 3966	75	0.4	9	43	.066
	6/17 As 2nd cover, with L. arsen. 3℔s., and Bordeaux 1-3-100	R 2105	76	0.5	14	7	.030
5	6/3 L. arsen. 3℔s., **Colloidal 77C** 4 oz., Orthol-K 4.8 pts.	S 3167	75	0.2	7	36	.066
	6/18 As 2nd cover plus Bordeaux 1-3-100	R 2980	78	0.2	11	6	.053
8	6/3 Nic. sulf. 1 pt., Wyoming Bentonite pellets 5℔s., Crude soybean oil 1 qt.	S 4032	86	0.3	6	39	—
	6/17 As 2nd cover 6/26 As 2nd cover						
0	No cover sprays	S 5010	48	19.0	60	23	—
		R 2525	39	24.0	72	8	—

Petal fall 5/8-13 and 1st cover 5/20-22 uniform L. arsen. 3℔s., manganese sulfate 4 oz., sk. milk powd. 8 oz., liq. lime sulfur 1.3 gals., hyd. lime 8 oz. Treatments 2, 3 and 4 are tank-mixed "dynamite" sprays.

Not all the first brood spray treatments are given in table 1. Modifications of treatment 2, which in one case employed 3 pounds of lead arsenate in both second and third cover sprays and in the other substituted No. 3 for No. 2 fuel oil, failed to equal the performance of this treatment. Also omitted are mixtures which differed from treatment 5 only in the brand of deposit builder. One used **Orthex** and the other **Spraylastic**, at 1 quart per 100 gallons. In both cases, results were but slightly inferior to treatment 5.

Treatment 8 received a first cover spray of lead arsenate followed by three covers of tank-mixed nicotine bentonite, the schedule ending on June 26. This treatment produced the highest percentage of clean fruit and also the lowest number of worms. Unfortunately, it also caused a rather large loss of foliage, in addition to the injury reported in table 1. This was due to the smothering action of the heavy deposits of bentonite, which persisted until harvest in quantities sufficient to give the trees a ghostly appearance. The amount of bentonite employed in this spray mixture apparently is necessary for the most complete "fixation" of the nicotine. However, since it loses nicotine gradually after application, yet persists on the foliage and fruit, equally good results might be obtained by using reduced amounts of bentonite in successive spray applications. This possibility will be investigated.

Extensive samples of leaves were scored for spray injury in September by H. J. Miller of the Department of Botany. A leaf was recorded as injured if it showed the slightest degree of marginal or tip browning, or any dead spots. Injury to Rome was of no consequence whatever, and was less serious on Stayman than the figures in table 1 would indicate. However, on this variety somewhat more foliage injury was evident from most of the "dynamite" treatments than from the "standard" spray mixture used in treatment 1. Encouragingly, this was not true of treatment 5.

Lead residues at harvest were below the tolerance of .05 grains per pound on the Rome, except in treatment 5, and above tolerance on the Stayman, which were of much smaller size at harvest.

Tests of Late Arsenical Spray Mixtures

For the purposes of discussion the tests of late cover sprays may be divided into two parts. Four treatments involved comparisons of spray schedules and mixtures employing arsenicals, while eight treatments employed various substitutes for lead arsenate in a schedule of two sprays timed for maximum effectiveness against second brood larvae.

Table 2. Tests of arsenicals in late codling moth sprays on Stayman Winesap (S) and Rome Beauty (R) Baugher Orchard, Aspers, Pa., 1941.

Treatment No.	Schedule and materials Amounts per 100 gals. of diluted spray mixture	Total Apples per Tree	Per cent uninjured Fruit	Worms per 100 apples at Harvest	Per cent Injured Leaves—Sept.	Lead Residue Grains per ℔.
9	7/11 L. arsen. 3℔s.	S 4219	76	5.7	29	.079
	Bordeaux 1-3-100	R 2818	75	6.9	8	.112
	8/9 Same					
10	7/29 L. arsen. 3℔s.	S 3709	76	3.4	38	.100
	Bordeaux 1-3-100	R 3722	83	3.4	14	.110
	8/9 Same					
11	7/29 L. arsen. 3℔s.	S 3938	71	6.3	34	.069
	Bordeaux ¾-6-100	R 2756	80	4.7	10	.075
12	7/29 Cal. arsen. 3℔s.	S 3803	69	7.8	44	.058
	Bordeaux ¾-6-100	R 2270	74	8.3	15	.116
21	No second brood sprays	S 3054	70	12.7	43	.059
		R 2310	76	15.2	10	.039

Petal fall and 1st cover uniform as in Table 1. 2nd cover 5/28 and 6/3 L. arsen. 3℔s., No. 2 Fuel Oil 4 pts., Fish Oil 1 pt., 20% amm. oleate 1 pt., BL 40 ¾ pt. 3rd cover 6/16 and 6/19 L. arsen. 3℔s., No. 2 Fuel oil 4 pts., Fish Oil 1 pt., 20% amm. oleate 1.5 pts., Bordeaux ¾-2¼-100.

The figures in table 2 allow several statements to be made about the timing of late arsenical sprays. First, the application of July 11, when fresh codling moth injury had practically ceased, was of very little benefit in codling moth control, as compared with later sprays. Two observations lead to this conclusion. First, worm control at harvest was better where late arsenical sprays were applied on July 29 and August 9 (treatment 10) than where the same spray mixture was applied on July 11 and August 9 (treatment 9). Second, a single application of lead arsenate on July 29 (treatment 11) gave nearly as good results as the two applications of treatment 9 on Stayman, and better results on Rome.

The application of August 9 was of considerable benefit. Compare treatments 10 and 11.

Calcium arsenate was less effective than lead arsenate in one second brood application, and produced somewhat more foliage injury. With this exception, foliage injury to Stayman was somewhat less than on the trees that received first brood treatments only, due probably to the protective action of the weak Bordeaux mixture included in the late applications. The foliage injury figures in table 2 suggest that the Bordeaux application of July 11 was more effective than that of July 29 in preventing arsenical injury from the first brood sprays. Compare treatments 9 and 10.

The late arsenical applications produced harvest residues in excess of the tolerance on Rome as well as on Stayman. The lead level was particularly high where lead arsenate applications were timed for maximum effectiveness against the second brood. It was not too great, however, for satisfactory removal with 1 per cent hydrochloric acid in ordinary washing procedure.

Substitutes for Lead Arsenate in Second Brood Sprays

Substitute materials were tested in spray applications of July 29 and August 9. They included three treatments in which products containing rotenone replaced ⅔ of the lead arsenate, three formulations of nicotine, one mixture of thiocyanate in summer oil emulsion, and one dinitro powder.

Table 3. Tests of substitutes for lead arsenate in second brood sprays to Stayman Winesap (S) and Rome Beauty (R). Baugher Orchard, Aspers, Pa., 1941.

Treatment No.	Materials applied 7/29 and 8/9 Amounts per 100 gals. of diluted spray mixture	Total Apples per Tree	Per cent Uninjured Fruit	Worms per 100 Apples at Harvest	Per cent Injured Leaves—Sept.	Lead Residue Grains per ℔.
10	L. arsen. 3℔s.	S 3709	76	3.4	38	.100
	Bordeaux 1-3-100	R 3722	83	3.4	14	.110
	Rotenone in penetrants					
16	**NNOR** (Atlas Powder Co.) 1 qt.	S 3241	77	3.0	61	.067
	L. arsen. 1℔.	R 2494	82	5.3	22	.065
17	**DX** (B. G. Pratt Co.)1 qt.	S 3958	71	8.2	53	.082
	L. arsen. 1℔.	R 1855	78	6.9	23	.076
18	**Form. 157** (Angier Co.) 1 qt.	S 4202	72	5.2	47	.099
	L. arsen. 1℔.	R 2283	77	7.8	15	.085
	Nicotine formulas					
13	Nicotine sulfate 0.5 pt.	S 4040	73	8.1	48	.056
	No. 2 Fuel oil 1 gal.					
	Emulsifier (Rohm & Haas Co.)					
	3fl. oz.	R 3667	73	12.6	17	.044
19	Nicotine sulfate 1 pt.	S 4871	77	5.4	39	.060
	Wyoming bentonite pellets 5℔s.	R 1763	82	5.1	18	.049
	Crude raw soybean oil 1 qt.					
	followed by **Nicomulsion** (Sherwin					
	Williams Co.) 3 qts.					
20	**B. L. 155 Conc.** (Tob. By-	S 4107	75	8.7	44	.061
	Prod. Co.) 3℔s.	R 1484	77	9.4	10	.070
	Summer oil emulsion (Rohm					
	& Haas) 1 pt. followed by					
	Nicomulsion (Sherwin					
	Williams Co.) 3 qts.					
14	**Dow C-111** Powder 20 Oz.	S 4640	69	14.9	41	.037
		R 3052	75	9.1	12	.050
15	**R & H Summer Oil** 3 qts.	R 4498	66	14.5	45	.057
	Lethane HE-60 14 fl. oz.	R 2371	75	9.2	12	.047
21	No second brood sprays	S 3054	70	12.7	43	.059
		R 2310	76	15.2	10	.039

First brood sprays as stated at foot of Table 2.

The results of these treatments are given in table 3. By comparison with treatment 10 it will be seen that none of them performed as well as lead arsenate on both varieties. The best of these treatments, judged by the number of worms per 100 apples at harvest, was No. 16, in which a reduced dosage of 1 pound of lead arsenate was fortified by 1 quart of a preparation containing rotenone in a powerful penetrant, mannitan monolaurate. The other formulations of rotenone, treatments 17 and 18, were somewhat less effective. Present objections to the use of NNOR for codling moth control include increased foliage injury and cost. At 1941 prices, treatment 16 cost one dollar more per 100 gallons than treatment 10. In orchards requiring European red mite treatment, however, part of the increased cost could be charged against control of this species.

Among the three nicotine schedules tested, one application of tank-mixed nicotine bentonite followed by one of nicotine sulfate in ½ per cent summer oil emulsion (treatment 19) gave better results than either commercial fixed nicotine followed by nicotine sulfate, both with summer oil emulsion (treatment 20) or two applications of nicotine sulfate in a tank-mixed emulsion of heavy fuel oil (treatment 13).

The dinitro powder (treatment 14) and thiocyanate in summer oil emulsion (treatment 15) gave indifferent results against second brood codling moth. They were included in this study to supplement more promising tests, reported elsewhere, against the European red mite.

The tests of 1941, added to those conducted in previous seasons, show that lead arsenate is the cheapest and most effective material for codling moth control in south-central Pennsylvania, even in second brood applications, and that the best substitute material for a non-wash schedule is one or more applications of tank-mixed nicotine bentonite followed by oil-nicotine.

Under the conditions existing in the experimental block in 1941, two extra spray applications of lead arsenate gave a gain in Stayman yield of 1.3 bushels of unblemished fruit or 2.1 bushels of salable fruit per tree, as calculated from the figures for treatments 21 and 10. Considered alone, this gain might appear not to justify the extra expense of application in some orchards. But it was accompanied by a reduction in the number of codling moth larvae from 470 to 126 per tree, presaging an easier fight against the codling moth in 1942. Not all the benefits are evident in the current crop. Second brood codling moth applications will doubtless pay in some of our more heavily infested orchards, but a nice judgment on the part of the grower is needed to determine this point.

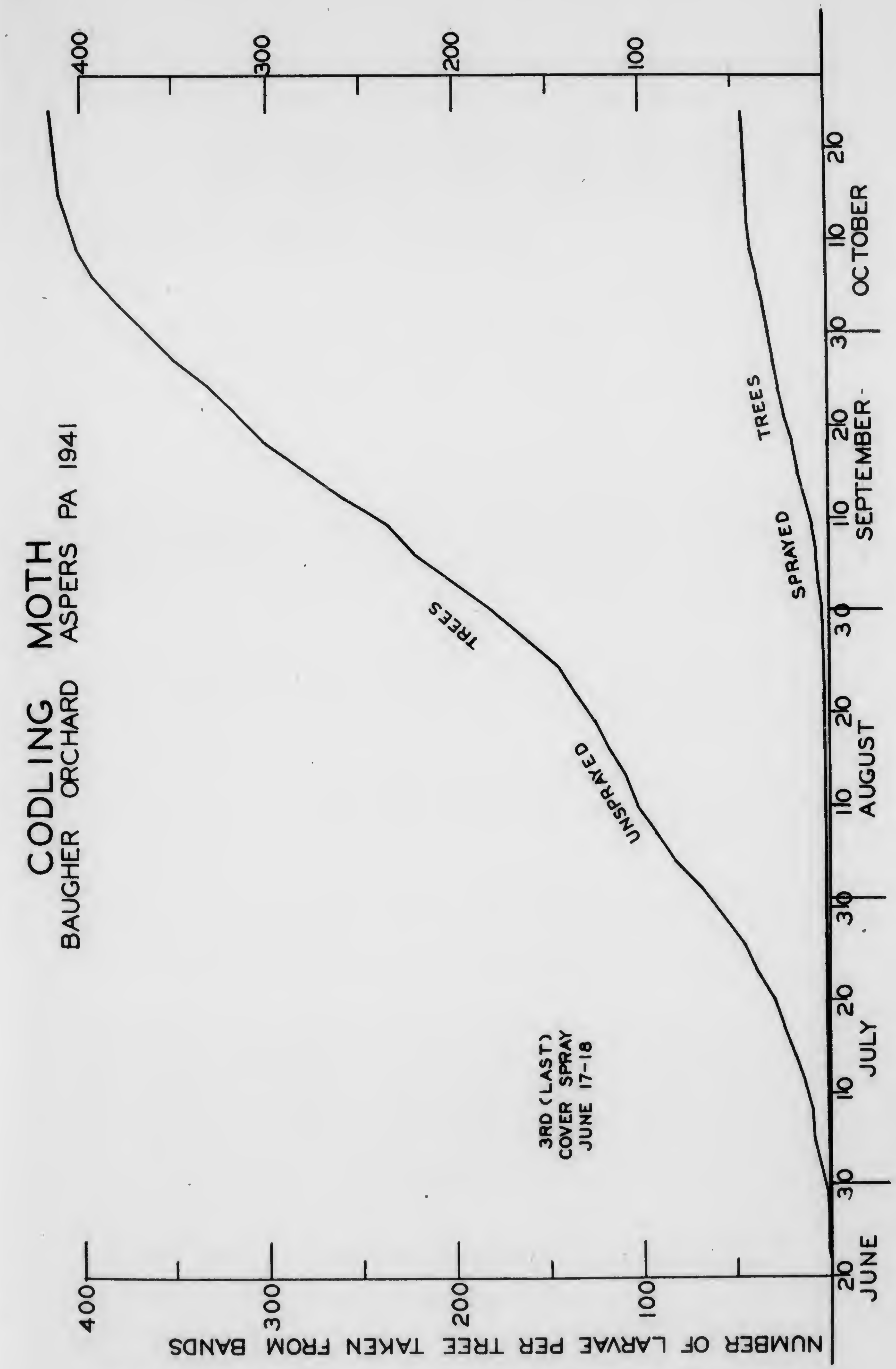

Fig. 2. Codling moth larvae per tree taken from bands. On sprayed trees only a small, late population developed.

TEAMWORK

DOES THE TRICK

Cooperative marketing programs, teamed with modern chain-store streamlined mass distribution, are proving to be one of the most effective means for developing wide, stable and profitable markets for such home-grown produce as apples, potatoes, and other fruits and vegetables.

This has been recently demonstrated in Pennsylvania in the case of potatoes. Potato growers launched a marketing program through the Pennsylvania Potato Growers Association in 1938. After adopting a program for voluntary grading and packing, the growers worked out an orderly marketing plan with Pennsylvania chain-store organizations. Initial disappointments and temporary setbacks were solved by trial and error methods. Today the Association is able to announce substantial benefits.

By 1941 sales reached two million pecks. In 1942 sales are expected to triple, perhaps quadruple those of the previous year, as store-door deliveries to chain-store super markets move as high as a million pecks a month.

Returns are also improved. On occasion store-door delivered Blue Labels have netted growers as high as 86c of the retail dollar, according to **The Guide Post,** publication of the Penna. Cooperative Potato Growers Assn.

More and more Pennsylvania housewives have learned that graded and standard packed Pennsylvania potatoes are dependable potatoes. Grading and packing and a cooperative marketing plan plus chain store promotion have been teamed up to enable Pennsylvania to meet the competition of potatoes produced elsewhere.

This cooperative marketing plan demonstrates a principle which is being effectively applied to many other fruits and vegetables in other states. Teamwork between growers and distributors in developing, grading and marketing programs is as effective for other products as it is for potatoes in reducing the market spread, in widening and stabilizing the market, and increasing the aggregate return to growers.

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Fungicides and Codling Moth Control

A second block of mature Stayman Winesap trees in the Baugher orchard was laid out by the Botany department for studies of spray injury and apple scab control. In certain of these treatments records of the codling moth infestation were taken throughout the season, as in the main codling moth control blocks.

Table 4. The effect of fungicides on codling moth control. Stayman Winesap. Baugher Orchard, Aspers, Pa., 1941.

Treatment No.	Schedule and materials Amounts per 100 gals. of diluted spray mixture	Total Apples per Tree	Per cent Uninjured Fruit	Worms per 100 Apples July 10	Worms per Apple Harvest	Per cent Injured Leaves—Sept.	Lead Residue Grains per lb.
	Petal-fall 5/8-9 and 1st cover 5/20 uniform. L. arsen. 3lbs., Flot. sul. paste 12lbs., Hyd. Lime 5lbs. 2nd cover 5/28-9 uniform L. arsen. 3lbs., Hyd. Lime 3lbs. 3rd cover 6/20, 4th cover 7/9, and 5th cover 7/31 as follows:						
2	L. arsen. 3lbs., 1-5-100 Bordeaux	2352	73	1.6	7.7	8	.083
7	L. arsen. 3lbs., **Basicop** ½1-5-100 **Spraylastic** 1 qt.	2564	65	2.2	9.8	21	.051
8	L. arsen. 3lbs., **Tenn. 26** 3-5-100	2998	66	2.5	13.6	13	.068
9	As treat. 8 plus **Spraylastic** 1 qt.	2713	65	2.2	12.6	14	.066
10	As treat. 8 plus **Orthex** 1 qt.	2968	72	1.3	9.1	11	.065
11	As treat. 8 plus Soya flour ½ lb.	2880	71	2.6	9.5	13	.046
	2nd cover 5/28-9 L. arsen. 3lbs., Hyd. lime 3lbs., 3rd cover 6/30, 4th cover 7/9, and 5th cover 7/31 as treat. 2 above. Petal-fall 5/8-9 and 1st cover 5/20, as follows:						
13	L. arsen. 3lbs., Lime sul. 1.3 gal., Mang. sulf. 4 oz., Sk. milk powd. 8 oz.	1697	72	1.9	6.6	—	.060
14	As treat. 13 plus Hyd. lime 8 oz.	2301	73	2.6	6.3	—	.056
0	No sprays	1312	39	10.1	68.9	—	—

The records presented in table 4 show that lead arsenate in a 5 cover spray schedule gave better codling moth control and less foliage injury when 1-5-100 Bordeaux mixture (treatment 2) was used rather than **Basicop** (treatment 7) or **Tennessee 26** (treatments 8, 9, 10, 11) in the last three sprays. The latter material seemed to interfere most with codling moth control, and its performance was not much improved by the addition of the deposit building material **Spraylastic** (treatment 9). **Orthex** (treatment 10) and Soya flour (treatment 11) partly offset the deleterious effect of

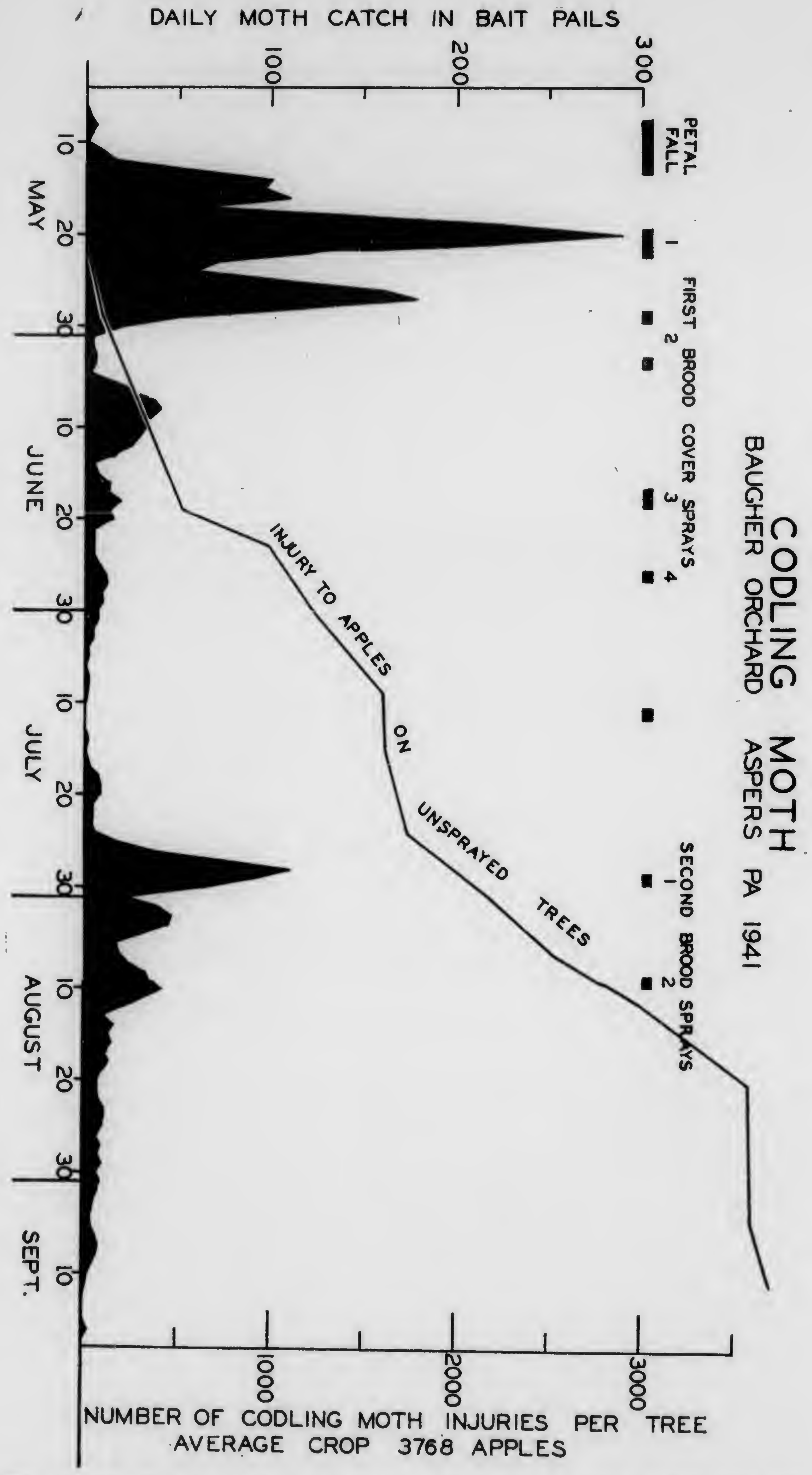

Fig. 1. Codling moth spray dates in relation to moth flight and the onset of larval attack.

Tennessee 26 on codling moth control. Overspraying was not practised in this block, or results with the deposit building materials might have been better, and spray injury to the foliage a little more pronounced.

The figures at the bottom of table 4 show no evidence that hydrated lime is of benefit in codling moth control when added to the mixture of lead arsenate, lime sulfur, manganese sulfate and skim milk in petal fall and first cover sprays.

Conclusions

As a guide to 1942 spraying practice in Pennsylvania orchards affected by moderate to severe codling moth infestations, the results of investigations to date indicate that the best codling moth control can be obtained through the adoption of the following cover spray program.

First Brood Sprays

1st Cover	Lead arsenate 3 pounds Liquid lime sulfur 1.3 gallons Manganese sulfate 4 ounces Skim milk powder 8 ounces
2nd Cover	Lead arsenate 3 pounds Deposit Builder *
3rd Cover	Lead arsenate 3 pounds Deposit Builder * Bordeaux mixture 1-3-100 or 1-5-100

The first brood sprays should be timed by means of bait pail catches of moths and supplementary observations on "stinging", particularly in the tops of the trees, to maintain coverage during the period of attack and to renew it at the most critical periods. In the second and third cover sprays application should be very thorough, until the trees drip freely, and four-fifths of the spraying time should be spent trying to cover the top centers of the trees.

Second Brood Sprays

4th Cover	Lead arsenate 3 pounds Bordeaux mixture 1-3-100 or 1-5-100
5th Cover	Lead arsenate 3 pounds Bordeaux mixture 1-3-100 or 1-5-100

The second brood sprays may not be required. Their necessity and timing should be determined by means of bait pail catches of moths and supplementary observations on the appearance of fresh "stinging" in late July and August.

Application of the spray schedule outlined above should not necessitate fruit washing unless second brood sprays are

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*Do not confuse deposit builders with ordinary spreaders and stickers. Use them strictly according to manufacturer's directions. Use of the following products has resulted in increased codling moth control in our experiments. **Colloidal 77**, Colloidal Products Company, with **Orthol-K**, California Spray-Chemical Company; **Orthex**, California Spray-Chemical Company; **Petrocide**, Latimer Goodwin Company; **Spraylastic**, Sherwin Williams Company. The homemade deposit builders used in our experiments to date have proved the value of inverted lead arsenate spray mixtures, but have been difficult to handle. Their use is not advised at present, except for small-scale trials.

applied, except for apples of the smallest packed sizes. Washing will surely be required if second brood sprays are applied. At increased expense and a possible sacrifice in disease control, a non-wash schedule can be made up as follows:

First Brood Sprays

1st Cover As above
2nd Cover As above
3rd Cover Nicotine sulfate 1 pint, Wyoming Bentonite pellets) 5 ℔, Crude ray soybean oil 1 quart.

4th Cover Nicotine sulfate 1 pint, Bentonite 5℔, Soybean oil 1 quart.

The third cover should be timed as in the lead arsenate spray schedule. The fourth cover should follow in 10 days.

Second Brood Sprays

5th Cover Nicotine sulfate 1 pint, Bentonite 2. 5℔, Soybean oil 1 pint,

6th Cover Nicotine sulfate 1 pint, Summer oil emulsion 0.5 per cent actual oil.

The second brood sprays should be timed as indicated in the lead arsenate spray schedule above. In most seasons the fifth cover spray should be applied during the last 5 days in July, with the 6th cover following in about 10 days.

In both the lead arsenate and the non-wash codling moth schedules a supplementary application of 1-3-100 Bordeaux mixture alone will probably be advisable in early July to aid in disease control and the prevention of spray injury.

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APPLE SPRAYS—DORMANT THROUGH PETAL-FALL[*]

H. M. STEINER, Department of Zoology and Entomology, Pennsylvania State College, State College, Pa.

Dormant tests of 1941: Our experimental program for 1941 included the study of sprays directed against apple aphids, European red mite, scurfy scale and the pistol case-bearer. These sprays were applied in the orchards of Edgar McDannel, William Oyler and Wilmer Roth near Arendtsville.

Petroleum oil sprays of 3 and 4 percent concentration were used as bases for several spray mixtures. **Goulac**-stock emulsions and tank mixtures prepared with blood albumen or **Goulac** were used. Three dinitro compounds and two coal tar distillates were mixed with the three types of petroleum oil sprays. The dinitro compounds included (1) a powder containing 40% dinitro-o-cyclohexylphenol (DNOCHP), (2) a powder containing 50% dinitro-o-cresol (DNOC) and (3) **Elgetol** containing a sodium salt of DNOC mixed with a wetting compound or "penetrant".

The three dinitro materials were stirred into a thin paste with water and added to 4% oils at an equivalent dinitro concentration of 6.8 and 12.0 ounces per 100 gallons of spray. DNOCHP was also tested in 4% oil at an equivalent dinitro concentration of 8 ounces and in three per cent oil at 6.8, 10.0 and 13.6 ounces per 100 gallons of spray. **Elgetol** was also tested at 2, 3, 4, 6 and 8 pints per 100 gallons in 3% oil.

We have previously obtained good control of aphids with 6 to 9 ounces of DNOCHP and 1/3 gallon of **Elgetol** in petroleum oils. Tar oils at 2.4% in 4% petroleum oil have been accepted standards for comparisons. Reports from other stations indicate that lower concentrations of the dinitro compounds in oil are effective against rosy aphis. We were unable to verify these results in our tests because of the scarcity of aphids in 1941.

Of the materials tested, blood albumen with tank-mixtures of 4% oil was most effective against European red mite and scurfy scale. Where DNOCHP was added to this mixture at the rate of 8 ounces (dinitro equivalent) per 100 gallons of spray, good control of case-bearers was also obtained but severe injury to the buds followed the application of this mixture.

Elgetol, DNOCHP and DNOC at 12 ounces (dinitro equivalent) added to 4% oils tank-mixed with **Goulac** produced no injury to buds and gave slightly improved results against scurfy scale over 4% oil alone but the slight improvement in control was hardly sufficient to justify their use against this pest. These mixtures gave 39 to 50% kill of pistol case-bearer larvae.

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More substantial reductions in numbers of living case-bearer larvae occurred where DNOCHP and **Elgetol** were added to 3% stock emulsions prepared with **Goulac** when DNOCHP was used at 13.6 ounces and **Elgetol** at 6 to 8 pints per 100 gallons of spray. **Elgetol** at these concentrations produced injury to the lateral buds of the twigs.

The pistol case-bearer has increased in numbers markedly during 1941 and further work will be done until the outbreak is suppressed. The work with sprays against this pest is proceeding co-operatively with the West Virginia Agricultural Experiment Station but only our results in Pennsylvania are discussed here.

In conclusion, the results obtained in our dormant tests indicate that low concentrations of dinitro materials in oil, as used successfully against aphids, were of little added value in the control of red mite, scurfy scale or pistol case-bearer. Higher concentrations of these materials are more effective against these pests but some spray combinations are decidedly unsafe and we need further tests to learn of the margin of safety where the different types of oil-mixtures are employed.

Delayed Dormant Sprays: We speak of the delayed dormant sprays as those which are applied when the leaf buds show green and the first leaves of fruit buds are expanded from ¼ to ½ inch. Our delayed dormant sprays were applied in the orchards of E. B. Romig and Edgar McDannel. We have repeatedly secured good results against European red mite with 3% oil tank-mixed with 2-4-100 Bordeaux mixture plus 1 pint of nicotine sulfate for rosy aphis. This mixture has produced no injury. 3% oil plus 0.5% coal tar oil is a more economical and effective mixture but its use is often accompanied by leaf scorch as has been the case where cresylic acid was used. The addition of liquid lime sulfur to delayed dormant oil sprays has increased the degree of leaf scorch when sprays were applied during periods of hot weather. Oils prepared with emulsifiers that are incompatible with lime sulfur should be avoided if lime sulfur-oil combinations are used. Lime sulfur-oil mixtures have given variable results against aphids and red mites and they have been most effective in warm weather.

Cube' powder containing 5% rotenone and used at 3lbs. per 100 gallons of spray has given good results in the delayed dormant spray against the pistol case-bearer. When cube' powder was combined with 1 pint of mannitan monolaurate, fair control of rosy aphis and European red mite was also obtained. An effective and economical combination includes 3lb. of cube' in a 3% **Goulac** stock emulsion or tank-mixture. 3% oils in the delayed dormant stage have given us considerable reductions in numbers of scurfy scale but an increased dosage of oil is required with most emulsifiers for heavy infestations of this pest.

Pink and petal-fall sprays for European red mite control: Since the control of European red mite by dormant sprays has given only fair results and usually merely delays the period of heavy mite attack later in the season, we have been interested in control of red mite and aphids in the delaped dormant and early foliage sprays. Red mite eggs are most susceptible to sprays just prior to hatching following the delayed dormant sprays. Often the grower who misses the dormant sprays finds that the delayed dormant period is abbreviated by warm weather and he continues such sprays over into the pink stage with materials that are not adaptable for this season. We have had some success with materials used in pink and petal-fall for red mite, aphids and case-bearer. The results against red mite are summarized in table 1.

The first hatch of European red mite eggs normally occurs between the delayed dormant and petal-fall sprays as they are applied to York Imperial trees. The hatch is usually completed when Stayman has reached the petal-fall stage. On York Imperial, the peak of hatching usually occurs at the pink spray period while on earlier blooming varieties it may occur during the blossom period. While the hatching proceeds at the same rate as to dates on all varieties, some varieties are in different stages of bud development when the hatch occurs.

Liquid lime sulfur has not been a dependable treatment for the satisfactory control of red mite because of the range in time of spraying and mite development and variations in temperature at this season. Liquid lime sulfur has been most effective against mites in the six-legged stage, a stage lasting 2-3 days after hatching. It is less effective against the moulting stages and against large mites. Occasionally, a lime sulfur spray applied at the peak of hatching by matter of chance has proved to be effective against red mite. High temperatures during spraying increase the kill by lime sulfur.

As shown in table 1, mannitan monolaurate in combination with wettable sulfur and cube' powder has been most effective in pink and petal-fall sprays. A dicyclohexylamine salt of DNOCHP has also shown possibilities for use at this season. We have used these aforementioned sprays safely on peach in petal-fall and later sprays. Injury with lime sul-

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healthy trees. Fine mist sprays give less injury than hard driven sprays. While annual applications of oil are a good form of insurance against build-up of heavy scale insect populations, the absence of scale in many orchards should give growers, who are on the watch for these pests, an opportunity to omit oil sprays occasionally.

Dormant oils have not given very satisfactory results against European red mite. While an increasing number of materials appearing for use in foliage sprays against red mite gives us much encouragement at the present time, we shall continue to seek for effective materials that may be used safely with oil in order that the concentration of oil in dormant sprays may be reduced.

Table 2. Response of Terrapin Scale and European Red Mite to Dormant Sprays in 1941.

Materials used per 100 gallons of spray:	% hatch: E. Red Mite	% survival Terrapin Scale	%buds killed by spray
Oil—4 gals. tank-mixed with 2-4-100 Bordeaux mixture	9	1	2
Oil—4 gals. tank-mixed with 8 oz. Goulac	18	2	3
Oil—4 gals. tank-mixed with 2 oz. Blood albumen	8	0	3
Oil—4 gals. tank-mixed with 2 oz. Blood albumen, 5 gals. lime sulfur	14	1	8
Oil—4 gals. tank-mixed with 8 oz. Goulac, 5 gals. lime sulfur	18	4	3
Scalecide—4 gals.	32	24	4
Scalecide—6 gals.	20	4	11
Oil—6 gals. tank-mixed with 8 oz. Goulac	10	0	11
Oil—Lethane, 3 gals.	26	7	3
Oil—3 gals. tank-mixed with 8 oz. Goulac	27	11	4
Oil—3 gals. tank-mixed with 8 oz. Goulac, 1 qt. Elgetol	18	7	22
Oil—3 gals. tank-mixed with 8 oz. Goulac, 2 qts. Elgetol	21	2	41
No Spray	79	90	3

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FUELS—Truck, tractor and stationary engines
Gasoline, kerosene and fuel oil
Lubricating oils and greases

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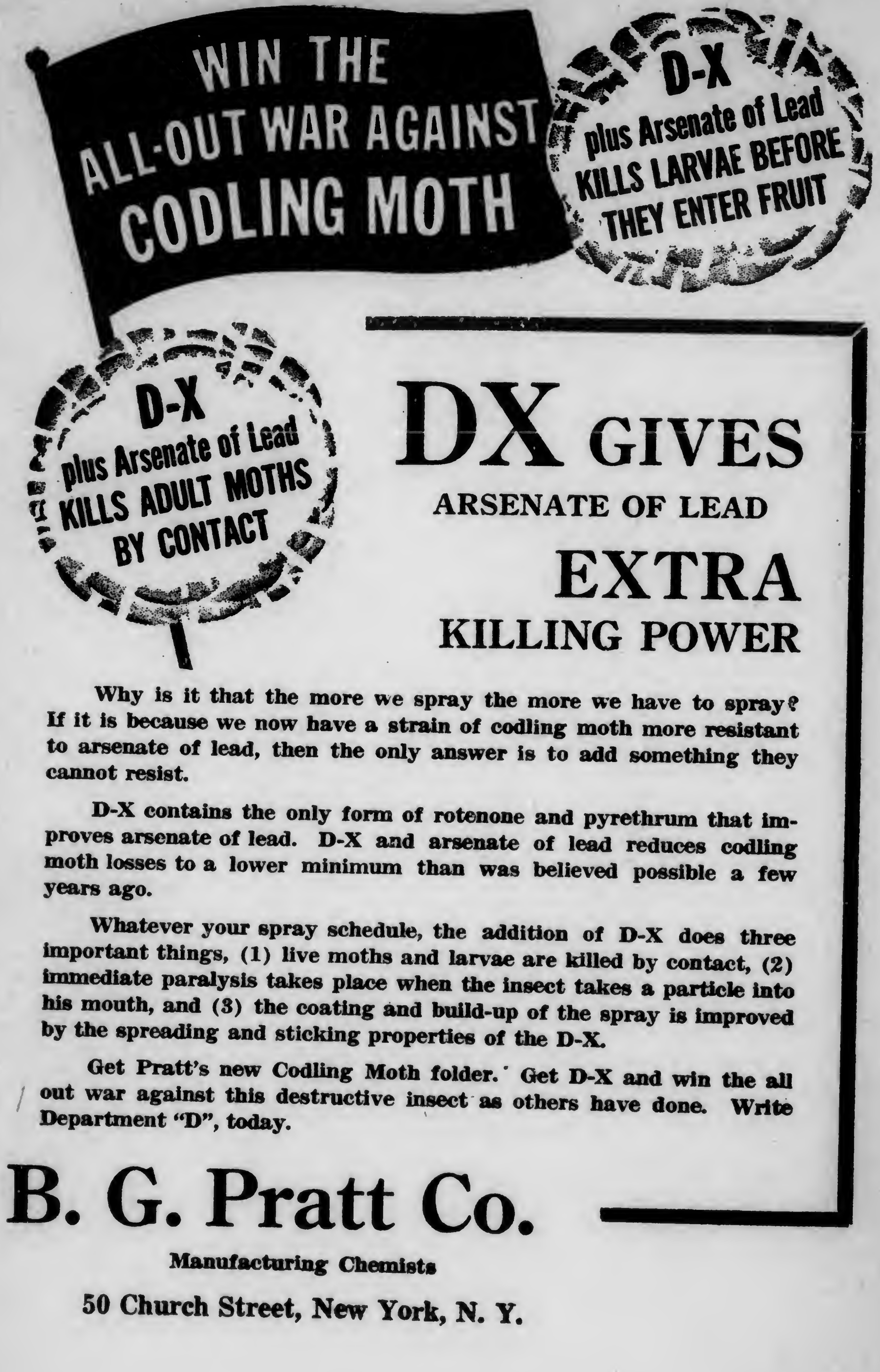

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